Degree of Master of International Studies
(International Area Studies)

Political challenges of Global Environmental Security: uranium legacy in Kyrgyzstan, obstacles, perspectives and regulatory infrastructure

August 2018

Development Cooperation Policy Program
Graduate School of International Studies
Seoul National University

TIMUR DOSMAMBETOV

Political challenges of Global Environmental Security: uranium legacy in Kyrgyzstan, obstacles, perspectives and regulatory infrastructure

A thesis presented

by

TIMUR DOSMAMBETOV

A dissertation submitted in partial fulfillment

of the requirements for the degree of

Master of International Studies

Graduate School of International Studies

Seoul National University

Seoul, Korea

August 2018

ABSTRACT

After 1991, since declaring and independence from the USSR, Kyrgyzstan and other Central Asian countries have encountered a wide pattern of concerns including environmental and security issues which were inherited with the fall of the Soviet Union and its vast nuclear infrastructure. One of them is abandoned uranium mines, unprotected uranium tailings, and wastes located in vicinity to populated areas.

If an environmental emergency involving these tailings were to happen, particularly in transboundary areas, it can influence the health, economy, and environment of the whole region. Such well-known threats are widely consulted at numerous levels of government and by diverse groups of experts.

The paper is aimed to analyze risks posed by the uranium legacy sites and radioactive sources in Kyrgyzstan since obtaining an independence 1991 from USSR as well as examining efforts undertaken by the country and international community to address these threats.

The case studies show an integral example of security dangers and could help to address similar issues in other countries.

Keywords: environment, environmental security, remediation, uranium tailings, uranium legacy, Kyrgyzstan, politics, policy

Student Number: 2016-28472

ABBREVIATIONS

CAREC	Central Asia Regional Economic Cooperation
EBRD	European Bank for Reconstruction and Development
ENVSec	Environment and Security Initiative
IAEA	International Atomic Energy Agency
OSCE	Organization for Security and Co-operation in Europe
RW	Radiactive wastes
TSO	Technical and scientific support organizations
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
UNEP	United Nations Environment Program
UNDP	United Nations Development Program

Table of Content

List of Figures

CHAPTER 1: GENERAL INTRODUCTION

1.1 The origins of the study and nature of the problem

The basic idea of the thesis lies in reframing of security discourse in the frame environmental security as one of the significant imperative in international relations, specifically in the perspectives for the Kyrgyz Republic.

The thesis will examine the utility of environmental security as a unifying concept in contemporary social science, including the conceptual framework of the study of international relations and particularly, international organizations, which are playing a great role in ensuring environmental security. These institutions, can be seen both as constraining and promotional agents according to some experts.

In the XXI century, the environmental component became an integral part of international relations. Environmental issues were leading to the change of entire paradigm of human development. The basic was made in the middle of XX century, when the international community faced with problems that could not be solved within the framework of existing development model – the model of mass production and consumption and military industrial competition during Cold War period. The global economic system reached a critical point in which the problems of pollution of nature became serious that they pushed to think

about the development and nature which found reflections in the Millennium Development Goals and Agenda 21.

Sharply sound environmental problems – along with economic and energy – have called into question of preserving the human and the former imperatives of international development. Images of international security were filled with new content: now they were not limited only to the military and political component, but also included the human component, where the most important part was environmental security acted as a guarantee of health safety.

The environmental security matters are not only natural-scientific but also social and political. The concept of environmental conflict is closely bound to the state security. Due to it, the research will also consider how unconventional conflicts can be shaped and formed by societal issues, caused by environmental factors as well as it will be analyzed how these factors can contribute to the politicization of the environmental concerns posing a threat to the Central Asian region and serve as a platform for the cooperation.

The risk evaluation sheet of the IAEA report assessed with the high probability the possible occurrence of cross-border affects and discords with neighboring countries due to pollutions from some tailings in Kyrgyzstan.[1] However, the problem of uranium tailings still on the agenda during several decades.

[1] IAEA (2010a, 32)

During the 72nd General Assembly on September 20th, 2017, the President of Kyrgyzstan Almazbek Atambaev in his speech noted, that there is a number of large uranium tailings positioned in close vicinity to water sources and rivers in Kyrgyzstan. In case of possible accidents at tailings, the pollution of rivers in the region with highly toxic wastes can lead to ecological and humanitarian disasters, which will endanger the lives and health of millions of people, including the socio-economic situation of some Central Asian states.[2]

This was the first time when the problem of environmental security and radioactive wastes was stated in the UN Assembly by the high-level politician and openly declared necessity for the international cooperation. Due to it, the research will focus on the point that the role of the state and security, as well as human security, needs to be reconsidered under a new framework since the most threats to environmental security lie beyond the ability of any state to resist them alone. The protection of the environment must be a concern of all states, international, governmental and non-governmental organizations. International cooperation on environmental subjects is especially important since not all countries of the world have realized an importance of problems, particularly within the framework of international organizations.

[2] (Atambaev President 2017)

The radiological and chemical unfavorable situation in Kyrgyzstan, which located upstream of water sources, as well as possibilities of transboundary pollutions, can contribute to the emergence of conflicts, which in turn can lead to social and political issues.

The scientific originality of research is determined by the fact that it reveals the role of political problems in global environmental security and perspectives for the Kyrgyz Republic. There are numerous researches dedicated to the technical part of the uranium legacy in Kyrgyzstan, but they were not in the frame of political dimension identifying and overcoming political challenges.

This paper will study the environmental security issues of Kyrgyzstan, particularly environmental threats in the frame of nuclear and radioactive wastes. These areas will involve international cooperation and challenges within local and global agendas, including the role of international organizations, conventions, NGOs and Governmental Institutions. The study will be tied into the broader theme of environmental security and try to demonstrate its limits and potentials in international and domestic layers.

Kyrgyzstan has a quite young history in establishment of an environmental system in comparison with developed countries and still in the process of its development. It joined to the Soviet Union since 1919th and shared same history and political system of the USSR until its collapse and stated

sovereignty from the USSR on August 31st, 1991. However, Kyrgyzstan possessed chemical and radioactive wastes as legacy and operating mining and processing enterprise serving in the chain of nuclear fuel cycle.[3]

Currently, there are accounted about 92 sites with radioactive and toxic wastes from mining on the territory of Kyrgyz Republic, including 33 tailing dumps and 25 mining dumps (Ministry of Emergency Situations, with a total volume of 12 million m^3) are legacy of past mining activity. Most of them are located in the zone of formation of transboundary watercourses in the territory with high seismicity, landslide hazard.[4]

Dangerous mining wastes were buried more than half a century ago. Among the seven administrative regions, five have canned tailing dumps and mountain dumps that create a high risk of possible radioactive-ecological disasters, both for the water area of the unique Issyk-Kul Lake in the area the Kaji-Sai village, and territories of four Central Asian countries: Kyrgyzstan, Uzbekistan, Tajikistan and Kazakhstan.

According to the Kyrgyz Republic's Ministry of Emergency Situations,[5] nuclear fuel extraction is associated with the problem of radioactive wastes dumping from mining, which dramatically increases environmental risk. Withal,

[3] (Humphrey Paula Sevcik Margarita 2009)
[4] (KG MES 2017, 56, para 2.11)
[5] (KG MES 2016, para 2.3)

the permanent operation and rehabilitation of canned tailing dumps and mountain dumps in the conditions of high seismicity, landslide and seepage hazard of the territories, as well as periods of limitation and inadequate maintenance, have long led both to depressurization and leakage of radionuclides in the breakthrough of tailing dumps.[6] In this regard results of the research can be beneficial in the fields of policy-making, identification of perspectives for further studies and priorities of cooperation in the frame environmental security.

The paper will be aimed to consider environmental policies of the leading world actor as the EU and make comparative analysis with environmental policy of Kyrgyzstan to develop necessary recommendations to strengthen environmental security infrastructure and integrate it into the system of international environmental security.

1.2 The structure of the thesis and outline of the chapters

The purpose of the research is to understand causes and effects of political challenges in ensuring environmental security hampered by the contradictions of the interests of actors in local and international levels and develop policies to mitigate emerging environmental and societal issues in domestic level.

[6] (KG MES 2016, para 2.4)

The priority of the environmental component in the national security structure raises the scientific interest in analyzing and understanding the issues of protection of the State and society interest in the environmental field.

This purpose will be implemented through solving the research questions like:

1) What is the appropriate definition of environmental security, particularly in the frame of nuclear and radioactive security?
2) How has the problem of uranium tailings in Central Asia become a global environmental security matter and what was the efforts of international community to address this emerging issue?
3) What are the differences in approaches to ensure environmental security in Kyrgyzstan and Europe and which best practice and institutional policy tools are available to prevent emerging environmental issues of uranium tailings in Kyrgyzstan?
4) Which type of political challenges is exist in building global environmental security? What was the reason for the long-term delay in addressing uranium tailings problem in Kyrgyzstan?

According to the above mentioned, during the research, it will be examined dependence between political problems of global environmental security and national interests and state sovereignty.

It is assumed, that each actor (state, terrorists, etc.), pursuing its own selfish goals, individually contaminates the environment. Nevertheless, environmental problems, by their nature, can be solved only through concerted entire world community endeavors. Hence, achieving global environmental security at the present stage is very difficult due to the nature of international relations and interests of actors described as quasi-anarchical.

This leads to the first hypothesis: Sovereignty of State and its national interest sets barriers to establish proper international cooperation in ensuring environmental security and strengthen environmental regime in global and local layers.

Due to this is will be interesting to consider following hypotheses during research. In developing countries, the main cause of environmental problems comes due to poverty, economic backwardness, underdevelopment of environmental legislation, corruption. The principle of "first development, then ecology," devalues the results achieved during economic growth.

In this regard it is raised the second hypothesis: Ethnocentric actions of State undertaken to ensure domestic environmental security is unproductive and will lead to seek for cooperation with international community to build effective environmental security regime and policy to diminish regional conflicts and enhance trust.

The paper argues that the environmental security concept is closely bound to the state security as well as human security discourse. Therefore, an environmental protection must be concern of all states, international, intergovernmental and mediating organizations since the fact that not all countries possessing sufficient qualification and technological culture as well as well-developed and consistent environmental policy. The latter increases the likelihood of negative environmental consequences.

Therefore, Chapter 1 provides the background to this study and introduction to the objectives of the research and to the existing theories narrowing them to the problem of radioactive security regime. The chapter outlines methods and analysis research basis and resources used in this study.

In Chapter 2 it is provided a theoretical framework of the study by reviewing the current literature on environmental security and ecological politology.

Chapter 3 introduces to the existing challenge with the Soviet uranium legacy and caused environmental problems to the Central Asia and Kyrgyzstan particularly.

The case studies are described in the Chapter 4 regarding the implemented projects and achieved results, outlining findings and actors, historical background instruments, archival documents and analysis.

Chapters 5 provides a discussion of the themes and issues identified during the research and presents findings of the analysis. The chapter also provides results and conclusions as well as recommendations on enhancing the regulatory system of the environmental protection and capacity building of nuclear and radioactive security. The chapter will give an overall summary of the research findings, conclusions, and specify some implications of the findings, considering limitations and suggestions as well for further research in this field.

The structure of the thesis determined by the logic of achieving the purpose and solving the articulated questions above and will consist of an introduction theoretical framework, analytical part, conclusion and bibliography.

1.3 Research Method and Methodology

The paper will be based on the qualitative method with descriptive research in order to build understanding of motivations and perceptions of the situation, particularly considering case study and later moving to the critical analysis. The research questions outlined in chapter 1 together with a review of the methodology utilized to examine empirically the associated schemes. The part will provide additional information on the fieldwork of the research questions and analysis techniques. The methodology of theoretical analysis will include empirical literature-based study through analyzing existing theoretical and

descriptive materials. The methodological basis of the research is a set of general scientific approaches studying traditional and new international security notions in environmental dimension, as well the place of environmental security in the paradigm of international relations.

Existing researches, both technical and analytical observations, and discourse analysis will be commonly used in the paper as well. It will refer to the existing literature and information, data to answer the posed research questions and address challenges as limited time, the fact that it is a preliminary study, financial constraints, etc.

The secondary data will serve for the several key functions, first, at the macro level, the purpose is to describe and understand the "overall picture" about the environmental security and theoretical backgrounds. Second, at the micro level, an information will represent individual accounts of the situation. Technical reports and studies will complement and personalize the collected data providing an opportunity to deeply understand the current situation and views to possible solutions.

Through an evaluative study of a process and policy, it is aimed to get an in-depth understanding of existing challenges and explain the behavior of actors. Particularly it is planned to base research on narrative analysis by considering processes within international and domestic levels to understand more about the

challenges and develop practical recommendation considering the social context in which the process occurs.

The set of data will be further augmented using an applied case study to explore applications and practices. The research for this study will be derived from following types of descriptive sources: (1) international conventions, protocols, agreements and treaties archival collections, (2) articles in magazines, internet resources and newspapers, (4) reports and documentations of various organizations and agencies, (5) official resolutions and decisions of state bodies, national and international organizations, (6) Specialized scientific publications on environmental issues.

In the part of policy analysis, it will be used the comparative methodological frame in order to understand environmental policy strategies of the Germany and European directives on legislative and operational level with Kyrgyz Republic.

1.3.1 Academic value

An academic value of the research is determined by the following results which are planned to obtain:

• Revealing dependence between the political problems of global environmental security and the concepts of national interests and state sovereignty.

• Examining of not just the scientific, but political components of a radiation security problem in the context of global environmental security.

• Analysis of different approaches ensuring the environmental security of developed country with Kyrgyzstan.

The practical significance of the work consists on the possibility of its using in further studies on the political challenges of international environmental security. The main conclusions of the thesis can be used by practical experts of state institutions involved in the development and implementation of environmental policy as well as by International Organizations. The materials of the thesis can also be used in educational programs, training courses and academic researchers on area studies and cooperation of international relations and world politics.

1.3.2 Expected results

Considering that thesis narrows the concept of environmental security to the political ground, it will be dealing with different aspects of environmental challenges and its impacts. The paper is not pretending to fully answer the primary question like precise definition of “environmental security.” However, research recognizes an environmental security concept and challenges

encountered by developing countries to identify effective strategies for prioritizing, evaluating, and advancing significant environmental problems.

Regarding strives, purposes of the thesis it will be an attempt to create an order around the political challenges of environmental security and get following results:

1. The correlation of the environmental security concept with international security and national security determined.
2. Identified environmental security definition in the frame of radiation (nuclear) infrastructure and security.
3. Provided an overview of the uranium legacy sites as one of the global environmental challenges and sources of threats to international environmental security, focusing on their political component.
4. Examined the peculiarities of the environmental policy of leading world actors and conducted a comparative analysis with environmental policy of Kyrgyzstan regarding uranium tailings and radioactive wastes and sources.
5. Based on a comparative analysis of environmental strategies, identified best practices and institutional policies to mitigate the emerging environmental issues in the frame of radiation security infrastructure and management of uranium legacy in Kyrgyzstan, developing recommendations on strengthening an environmental system.

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL BASIS

2.1 Environmental Security and International relations: Introduction to theories and trends

Environmental crises possess a global character; however, it was caused by the household activities of the subjects under the jurisdictions of different states. All states, as well as stakeholders, are compelled, in one way or another, to determine their position, actions, or inaction regarding environmental issues. Administrative control and state regulation of the natural resources representing clashes of interests, conflicts, aspirations for different forms of domination, leadership and political control. Both theoretically and institutionally are formalized to a phenomenon of environmental policy.

Along with the emergence and development of environmental policies of individual states, there will be raised an understanding about the necessity to systematically recognize the political sides of environmental crisis and its basis. The political problems of global environmental security are widely discussed in the modern scientific literature. In a political science, there are many definitions of environmental security, accentuating its various aspects. According to McNeil, the concept of environmental security even after more than two decades of discussion did not agree upon the common formulation.[7] However,

[7] McNeil, F. 2000. Making Sense of Environmental Security. *North-South Agenda,* 39 (2000)

in a number of definitions, Cheremisinoff emphasized two key elements like recovering an environmental harm to support a human life and preventing environmental loss from forms of human abuse.[8]

As Elizabeth Chalecki indicated, an environmental security reflects the capacity of a nation or community to endure environmental hazards or unfavorable changes as well as environmental asset scarcity and environment-related tensions and conflicts. Environmental threats are real and ongoing and unlike military threats, however, it is important to recognize that higher-order effects result from more intervening variables while considering problems of environmental security. Because not each environmental problem can lead to a security issue, mostly they can be generated from multiple conditions including political, economic or social matters.

Case studies based on science, according to the McNeil, merged political economy with physical science can be a proper means to forecast the likelihood of conflicts and related issues stemming from environmental degradation.[9]

In this sense Cheremisnoff identified an environmental security as actions and policies that can originate in national borders or across it. "[T]hose actions and policies that provide safety from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement or intentional

[8] Cheremisinoff N.P (2006 30)
[9] Frank McNeil (2000, 4)

design, and originating within or across national borders." (Cheremisinoff N.P 2006 6)

Elizabeth Chaleki supports that argument, concluding that the environmental security is not a clear security problem neither an environmental matter.[10] However, according to the Schwartz and Randall, an environmental issue should be often considered as security matters. Because, they can result in environmental perturbations without the direct impact, destabilizing the status quo and produce a loss of territorial, state, social, political and economic security.[11]

Jerome C. Glenn indicated several common elements defining environmental security, which includes public safety from environmental dangers caused by natural or human processes by virtue of mismanagement, accident, and ignorance; improving maintenance of natural resources; opposing to environmental degradation; promotion of social stability by prevention of the social disorder.[12]

In this paper, we are considering an environmental security concerns regarding uranium tailings and radioactive materials' releases to the environment threating human health. It is assumed that releases of chemical or radioactive

[10] (Chalecki Elizabeth L. 2002)
[11] (D. Schwartz P. and Randall October 2003)
[12] (Jerome C. Glenn Theodore J. Gordon, Perelet R. December 1998)

materials resulting an environmental alteration posing actual or perceived health risks can lead to societal and political conflicts.

The works of L.Brown, G.King, and Ch.Murray, R. Paris, M. Renner, H. A. Smith, J. Tuchman-Mathews, R. Ullman were dedicated to the environmental aspect of international security. [13] An implementation of the external (maintenance of sovereignty) and internal (ensuring the integrity and unity) components of national security often contradicts the desire to ensure environmental security. For example, national security refers to a limited territory, and environmental security often goes beyond state borders.

Also, one of the important trends in modern international relations is the shift in the security concept, where one of the main aspect is the environment. The influence of environment on security was studied by M. Ayoob, R. S. Dimitrov, T. Homer-Dixon, S. Lonergan.[14]

During XX and XXI centuries Russian scientists as V.I. Danilov-Danilyan, S.S. Gosteva, K. Kondratiev, K.S. Losev, [15] dedicated their works to the newly formed science that studied relationship of politics and environment calling it

[13] (Brown Lester R. and Worldwatch Institute 1977); (King Gary and Murray Christopher J. L. 2002); (Paris Roland 2001); (Renner Michael 1989); (Smith H. 2001); (Tuchman Mathews Jessica 1989); (Tuchman Mathews Jessica 1989)

[14] (Ayoob Mohammed and Lynne Rienner Publishers 2005); (Dimitrov Radoslav 2002, 677-691); (Homer-Dixon Thomas 1999); (Homer-Dixon Thomas F. 1995, 5-40); Gleditsch (Gleditsch Nils Petter 2010, 76-116); (Homer-Dixon Thomas F. 1991, 76-116); (Lonergan Stephen C. et al. 1991)

[15] (Gosteva S.S. Lopatin S.A. 2004); (Kondratev K. Danilov-Danilyan V.I., Donchenko V.K., Losev K.S. 1993); (Y.A. Izrael 2006); (Kostin A.I. 2005); (M.M. Lebedeva 2006);(Zh. Markovich D. 1997); (N.F. Reimers 1992); (A.V. Yablokov 1997); (O.N. Yanitsky 2002)

ecopolitology. The works were mainly devoted to the study of global political changes related to environmental constraints of the social development of the state.

The inevitability of global transformations related to the condition of the environment is recognized by all scientists also. Particularly Haas is concluding that, the political problems of global environmental security are present in neoliberalism, which gives the main role in ensuring environmental security to the international organizations, as well as the theory of epistemic communities exploring the role of scientists in addressing global environmental problems.[16]

The first group can refer to the supporters the traditional military approach to the notion of security, allowing to some extent its expansion and inclusion in the number of threats to environmental factors, indicating the lack of evidence and the full validity of incorporating new variables into the security concept. They agree that environmental factors add tensions to the conflict and exacerbate the existing crisis situation. They admit that the tension that followed the environmental problems could provoke conflict. However, the environmental factors themselves were not included by them in the number of those essential elements that could lead to an interstate conflict. [17]

[16] (Haas Peter M. 1991, 1-36)
[17] (Homer-Dixon Thomas F. 1995, 5-40).

On the opinion of the proponents of the new approaches, the fact of placing the states at the center of security concepts no longer answers their real role in the world system and it is necessary to pay more attention not to the security of states supported by military means, but to equality in the allocation of resources, the protection of the environment, human rights and health.[18]

New security concepts attracted attention because they appeared in the period of a decline in tensions in international relations, the beginning of reforms in the USSR and Soviet-American initiatives in the UN in the field of arms control. During this period, the necessity and the possibility of a new approach to the comprehension of security clearly articulated.

T. Homer-Dickson in his work defined five categories of possible conflicts where conflicts can be related to the local problems, such as intensive deforestation, construction of dams and flooding of territories, local pollution by any production, provoked by migration, social stratification, occurs between ethnic groups. All these factors, in turn, can be caused by the deterioration of the environment and depletion of resources.[19] However, Homer-Dickson identified depletion of resources not as a threat, but more diplomatically - a "stressor." The environmental dimension in the concept of comprehensive

[18] (King Gary and Murray Christopher J. L. 2002, 587)
[19] (Homer-Dixon Thomas 1999, 5)

security is concretized in two approaches: global environmental security and human security.

Jessica Tuchman-Mathews, in her article "Redefining Security" published in 1985,[20] also proposed to expand the boundaries of the security concept and include in its framework issues related to the environment and natural resources, as well as demographic aspects. The need for such a change in the concept of security rose because these problems have transnational character and considered the sovereignty of the state as an obstacle to achieving global environmental security.

Therefore, neoliberal approach emerged[21] in the study of political problems of global environmental security. Neoliberals disclose the mechanisms through which international organizations can enhance global environmental security. International, intergovernmental and non-governmental organizations develop an information database, which becomes the basis for developing policies in the field of international environmental security, exerting political pressure on states and influencing their behavior. Organizations played a crucial role in preparing such key international conferences as the Stockholm Conference of 1972, the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, the World Summit on Sustainable Development in

[20] (Tuchman Mathews Jessica 1989)
[21] (Colombo Dario 2014, 66)

Johannesburg 2002. They helped establish international regimes, conclude conventions and agreements in the field of environmental safety and security.

An important contribution to the analysis of international environmental security was also made by the theory of epistemic communities developed by Peter Haas. [22] In response to the increasing number of international environmental agreements that have been signed since the early 1970s, he highlighted the role of international scientific groups in world politics. Basically, these were studies of international environmental security problems. Epistemic communities are networks of individuals or groups that have authoritative knowledge for politicians within their expertise, who share firm principles and values, which make professional judgments that have common criteria for the objectivity of knowledge and possess certain political beliefs.[23]

According to Haas epistemic communities becomes politically influential when senior officials face complex technical problems and turn to experts for advice. He believes that crises lead to the development of epistemic communities, since decision-makers are more likely to turn to specialists. In every sphere of the environmental topics exists influential epistemic communities consisting of members of the international organizations and scientists.

[22] (Haas Peter M. 1991, 1)
[23] E. Adler (1992, 102)

As we can see studies in the field of environmental security and environmental issues have been the subject of a large number of studies by European, American and Russian scientists. Further we will briefly consider the features of various types of theories and publications on environmental security.

Also, one group of researchers show a natural interest in studying the experience of environmental policy of different countries. The greatest interest is represented by the leading world actors as the United States and European Union. Features of the U.S. environmental policy were studied by Russian and English scholars like A.C. Akishin, A. Marcus, J. S. Reitz, R.B. Stewart.[24] Yu.A. Borko, A.D. Rotfeld, M.V. Strezhneva, J. Golub devoted their works to study particularities of European policy.[25]

These two main actors have their own policy features where the environmental legal systems of the European Union are more systematized and institutionally centralized. In contrast, the US legal system is characterized by a high degree of institutional decentralization. Comparing the US and EU environmental policies, researchers conclude that a sovereign state, rather than a supranational institution, was more effective in the development and implementation of environmental policy. A positive feature of the American system is its

[24] (A.C. Akishin 2003, Agency U.S. Environmental Protection 1999, A. Marcus 1991, R.B. Stewart 2001, J.C. Reitz 2002)
[25] (A.D. Rotfeld 1995, J. Golub 1998, M.V. Strezhneva 2000)

transparency. Almost all US environmental institutions are open to public participation in decision-making. However, the European directives are better in structuring preventive measures.

Environmental Problems of Central Asia and their social and security impacts were considered by Jiaguo Qi, Kyle T., Benoit Morel, Igor Linkov, Alexander Carius, Brit Salbu, Lindis Skipperud as well as researches conducted by the United Nations Environment Programm (UNEP), International Atomic Energy Agency (IAEA), North Atlantic Treaty Organization (NATO) and etc.[26]

2.2 Environmental Security: Definition and its political challenges

As it was shown in the previous sub-chapter there are a lot of approaches in the environmental security discourse beginning from the traditional approaches and finishing with the multilateral perspective.

Russian scientists like Kochetkova identifies five main approaches of environmental security definition.[27] First, a *functional approach* considers the nature and activity of a person as an external to each other. In accordance with this approach, it was developed maximum permissible standards of

[26] (Carius Alexander and United Nations Environment Programme 2003, Qi Jiaguo, Evered Kyle T., and SpringerLink (Online service) 2008, Morel Benoit and Linkov Igor 2006, Salbu Brit, Skipperud Lindis, and SpringerLink (Online service) 2008)

[27] (Elena Kochetkova 2010, 15-16)

anthropogenic impact on the natural environment and security is reduced to their establishment.

The second, a *systematic approach* expressed in the concept of sustainable development, when the relationship between humanity and nature is a complex system. The main attention is paid to compliance with the parameters of the optimal condition. Environmental security stems from the maintenance of regimes for optimal sustainable development.

The third is the principle of a *holistic approach* based on the noospheric concept. The unity of the biosphere and humanity at the same time is a fundamental position. Dangers, emergencies, crises are explained as a consequence of the biosphere violation. They arise because of unconsciousness, spontaneous development. Therefore, the solution of the problems of ensuring environmental security is to reduce the conscious regulation of the relationship between mankind and the biosphere. The noospheric concept considers environmental security at the global level. The advantage of this concept is assuming of a clear dependence of environmental problems on human activities, and their solutions – from its reasonable organization. The lack of the concept is the idealization of the human mind, its ability to control its own development and the development of the biosphere.

The fourth is a *synergetic approach* related to the environmental security as an equilibrium condition of the system. The factors of danger are changes in the development regimes processes to the extreme, leading to a disturbance which threatens it with degradation. The application of the synergetic approach in the field of environmental security makes it possible to translate the unpredictable consequences of human activities into projected ones, to consider more adequately the features of the development of natural and techno-natural processes.

The fifth is an *activity approach* is based on the fact, that there are no threats from outside and human activity in natural systems. Security does dependent not from properties of the material, but on the availability or absence of human methods and means to work with them.

Since 1991, when Kyrgyzstan declared an independence, the concept of "environmental security" firmly established in the regulatory and legal acts. The term is used today in normative legal acts, including the Constitution of Kyrgyz Republic (Article 48), international legal acts, decrees of the President and Government.

The Government guarantees[28] the society to ensure environmental security as an integral part of the national security of the country, which is an indispensable

[28] (KR Decree #599 of 2011)

condition for sustainable development, the basis for preserving natural systems and maintaining the appropriate quality of the environment.

Thus, it can be assumed that an environmental security is an integral part of the national security of Kyrgyzstan. On the other hand, the implementation of external (maintenance of sovereignty) and internal (ensuring the integrity and unity of states) components of national security often contradicts the desire to ensure environmental security since national security limited within territory and environmental security often goes beyond the border, especially when the state cannot maintain ecological issues by itself.

T. Homer-Dickson in the monograph[29] defines five categories of possible conflicts, the cause of which was the unsuccessful provision of an environmental security dimension. The first category of conflicts is related to local problems, such as intensive deforestation, construction of dams and flooding of territories, local pollution by any production. The second category of conflicts provoked by migration and social stratification, it occurs between ethnic groups. The third category of conflicts is intra-social and is provoked by the depletion of natural resources, which in turn affects the economic condition of society, the standard of living, and causes a certain reaction of the elite and the state. The fourth category of conflicts is interstate, which occurs for a

[29] (Homer-Dixon Thomas F. 1991, 76-112)

certain resource, most likely, water. The fifth category of conflicts is the most global and can be caused between the North and the South.

The ecological dimension in the security concept is concretized in two approaches: global environmental security and human security. A representative of the first approach, Jessica Tuchman-Matthews, in her fundamental article called "Redefining Security" published in 1989, proposed to expand the boundaries of the security concept and include in its framework issues related to the conservation of the environment and natural resources, as well as demographic aspects.[30] The need for such change in the concept caused by the fact that these problems possess transnational features. Today, the line between domestic and foreign policies is increasingly eroding. Thus, the states are forced to deal with problems at the international level that were considered only a few decades ago at the national level.

Another difference between the concept of global environmental security and traditional approach to define environmental security is the attitude to the concept of sovereignty of states. The concept of global environmental security defines the sovereignty of state as negative factor and an obstacle to build strong environmental regime.[31] The unilateral actions of states undertaken by them for environmental protection have been inadequate, ineffective and

[30] (Tuchman Mathews Jessica 1989, 164)
[31] (Renner Michael 1989)

unproductive. Within the framework of this concept, states, as far as possible, need to adjust the concepts of national interests and sovereignty to promote cooperation and effective implementation of actions.

The Swiss project on Environment and Conflicts[32] analyzed forty conflicts and conditions allowing social conflicts to span a line of violence. The project identified five key situations like lack of regulatory mechanisms and poor state; spillover from the historic conflict; inevitable environmental conditions; opportunities to build organizations and find allies; instrumentalizing the environment. It came to a conclusion that conflicts provoked environmentally appear in violence merely when some of the five abovementioned key situations correspond.

Particular explanation was provided by Baechler,[33] describing that *inevitable environmental conditions* occur when survival group depending on degraded resources which do not have a replacement meets an imminent and accordingly foolhardy ecological situation.

Lack of regulatory mechanisms and poor state performance, he characterized by the incapable a political system producing certain social and political conditions, when achieving goals becomes impossible. Indicated deficiency happens from a weak state capability related to resource management or

[32] (Baechler G. 1999, 32-33)
[33] (Baechler G. 1999, 110-116)

livelihood security and disorder of public institutions established as regulators of access to resources.

An instrumentalization of the environment described by situation when an environment can be used or manipulated by the dominant players to serve the interest of specific groups, thereby making environmental discrimination as matter of group identity.

The condition of *opportunities to build organizations and find allies* characterized by players which organized into the alliances either from local or international groups such as IGOs concerned by related problems or specific elites and factions.

Another condition involves an environmental discrimination occurring within the scope of present historical conflict dimension allowing an issue to receive a new impetus. Baechler describes it as the *spillover from a historic conflict*.

Pamela Chasek [34] studied global environmental politics and distinguished several categories of obstacles in establishing strong environmental regimes. Particularly, there were highlighted systematic obstacles, lack of necessary and sufficient conditions, lowest-common-denominator problems, time-horizon conflicts, obstacles that stem from common charactersitics of global environmental issues, regime design difficulties

[34] (Chasek Pamela S., Downie, David Leonard Brown, Janet Welsh 2017, 258)

There are various authors tried to develop the concept of environmental security without limiting it by the academic value but also practical implications of their analyses. Existing studies helps to build theoretical basis to interpret global environmental politics and show understand how the historical processes of accumulation and consumption produced environmental challenge. The contribution of Homer-Dixon, Tuchman-Mathews, Baechler, Chasek and Chalecki lies in the analysis of the environmental security and its relationship between the domestic and international environmental regimes. Their analyses convincing re-capture close interconnectedness between the local and global paradigms, obstacles, dilemmas and solutions. Particularly it helps to build understanding how different regulatory regimes can affect environmental decision making, analyzing reasons why environmental problems arise, how they can lead to the conflict restrict the political meaning.

Findings of Baechler and Chasek will be utilized in this paper to assess the political challenges in addressing issues on uranium tailings as well as to identify the main rhetoric of the problem and propose necessary recommendations.

CHAPTER 3. SOVIET NUCLEAR LEGACY AND ENVIRONMENTAL CHALLENGE

3.1 Soviet nuclear legacy in Central Asia

After the collapse of the USSR, the borders of former Central Asian republics turned into state borders. At the same time, many natural resources appeared on different sides of the border, and the interconnections of the economic mechanism that had been integrated in the past were violated. From an environmental perspective, all this led to the fact that both sources and streams of pollution (accidents), as well as the places of their dispersal or accumulation, appeared on the territories of various states of Central Asia, which led to the emergence of concept – transboundary impact, which is usually understood as any impact on the environment within the affected country.[35]

It is known that the territory of Central Asian states during 50 years served as one of the main raw and mineral materials source of natural uranium, non-ferrous metallurgy, rare-earth elements for the former USSR. Due to activities of a number of processing minings a large amount of radioactive and toxic wastes stored in the territory of the Central Asian region, which was collected in mountain terrain, riverbeds, floodplains and river valleys, flowing into valleys and densely populated areas. Analysis of the current geo-ecological

[35] (Ragutskaya E. Baidakova N. 2001, 68)

situation in the region shows that the negative impact of waste is manifested primarily in two forms:[36]

- contamination of water resources with radioactive and toxic components;

- stimulation of dangerous natural and man-caused processes (landslides, mudflows, tailings pits) with adverse environmental consequences;

Due to difficult mountain terrain of Kyrgyzstan, in case of natural disasters, there can be formed so-called "synergetic" or multi-disaster, occurring together with natural and man-made disasters, such as earthquakes and damming, river valleys, flood, a breakthrough of dams, mudflow.

Moreover, in the flooded area or distribution of landslides streams can make chemical or radioactive hazard, which is fraught with occurrence not only of geodynamic, but also an environmental disaster, including regional scale transboundary pollution. Similar scenarios took place during the breakthrough of tailing dams in Mayluu-Suu (April 1958), Ak-Tyuz (December 1964). Another example is the torrent mudflow, which passed in June 1993 along the Torktent River in the Toktogul District. This torrent then transformed into a catastrophic flood, formed as a result of lake breakthrough during the Suusamyr earthquake.

[36] (Ragutskaya E. Baidakova N. 2001, 70)

The history of wastes from the uranium mining industry goes far to the past. The extensive development of the uranium mining industry in Central Asia has more than 60 years history. Before WWII, there was started a purposeful exploration of uranium ore deposits, and as a result, about 70 uranium deposits were discovered, on the basis of which, in the post-WWII years, mines and enterprises for the primary enrichment and processing of uranium were built to obtain nuclear fuel and materials. The initial links of the fuel production cycle – extraction and processing of uranium ores – the most significant production by mass of processed radioactive materials. They also give the largest amount of radioactive wastes, although it has relatively low activity.[37] The largest uranium deposits, processed by mining and having a transboundary impact are concentrated in mountainous and equally in parts of the Fergana Valley in the territory of Kyrgyzstan, Tajikistan, and Uzbekistan. According to the Report of Ministry of Ecology and Emergency of Kyrgyz Republic, the Fergana Valley has the highest population density in Central Asia and the highest population growth.

In Fergana Valley, according to the report of the Ministry, one of the main uranium ore mining and processing enterprises related to the former Leninabad Mining and Chemical Plant like: Mailuu-Suu, Shekaftar, Kyzyl-Jar

[37] (Ragutskaya E. Baidakova N. 2001, 71)

(Kyrgyzstan); Degmay, Taboshar, Adrasman (Tajikistan); Yangiabad, Charkesar (Uzbekistan). The total amount of uranium ore mining wastes deposited in the dumps at 2000 estimated 94 million tons, and the waste from the processing of uranium-bearing ores deposited in the tailing ponds is 80 million tons.

The issues of environmental assessment and prevention of environmental pollution from wastes of uranium mining industry at the listed transboundary sites have become particularly relevant in in connection with the liquidation of extractive and processing enterprises, termination of repair works and control as a result of collapse of the USSR, as well as activation of dangerous endogenous (earthquakes, tectonic activity) and exogenous geological processes (landslides, mudslides) in the areas of their location.

The adverse impact of these uranium mining facilities on environment of the region, as well as the increased likelihood of occurrence of environmental accidents, including transboundary nature, was considered due to overwhelming number of radioactive waste repositories located in the tunnels, floodplains and valleys of mudflow and floodwater in the Syr-Darya river basin (rivers Naryn, Mailuu-Suu, Sumsar, Chui, etc., see figure 1).

Figure 1. Source: National Report on the state of the environment of the Kyrgyz Republic for 2006-2011

Ministry of Environment and Emergency of KR noted that the situation was aggravated by the fact that after the collapse of the USSR and the collapse of the Minsredmash [38] activity in Central Asia, almost all of tailings became orphaned condition which led to the degradation of their defense facilities and gradual destruction. This was especially true to the old post-war tailings, which were built at the beginning of the nuclear industry development in 1946-1955. This stage was characterized by a serious underestimation of the environmental hazard associated with the radioactivity of the extracted and processed raw materials and their waste. From the standpoint of today, serious mistakes, miscalculations and short-sightedness in choosing tailing sites, engineering and geological surveys, design, construction, operation and conservation of these

[38] Ministry of Medium Machine Building of the USSR was the central body of state administration of the USSR, managing the nuclear industry and ensuring development and production of warheads

environmentally hazardous facilities were made.[39] There was no accumulated experience in monitoring of environmental conditions in the areas of radioactive wastes location, nor provided necessary environmental and protective measures and facilities.

During the USSR period, it was considered that this was a temporary way of disposing of waste and supposed to be subsequently processed to extract the remaining uranium and other valuable elements from wastes. Obviously, for this reason, the Soviet engineers did not consider alternative options for the removal and final disposal of radioactive tailings. However, the USSR collapsed and after many decades, these planes turned out to be untenable because of emerging environmental and economic problems. This indicates that the existing tailing dumps are practically the place of permanent warehousing and disposal of waste, and if to consider the long half-life of radioactive elements, they are practically long-term sources of radiation hazard with consequent consequences.

According to the technical studies,[40] the main causes of water pollution can occur due to the imperfection of hydraulic structures of tailing dumps, gradual degradation of their protective structures, emergency situations. In many cases the storage facilities operation, there is a filtration of their liquid phase, which

[39] (V.P. Torgoyev I.A. and Charsky 1998, 30-55)
[40] (Voitsehovich O.V. 2012, 6-8)

during storages in floodplains and riverbeds, can lead to their contamination with radionuclides and other toxic substances.

The main factors of irradiation paths at the sites of former uranium productions contamination are presented.[41] The ways of influence are:

- Gamma radiation from the surface of contaminated soils and indoors;
- Inhalation of radon-222 and short-lived daughter products of decay;
- Inhalations of contaminated aerosols (dust) indoors and outdoors contaminated areas;
- Consumption of food products grown in contaminated areas;
- Irradiation in case of direct intake to the contaminated soil;
- Irradiation because of polluted water consumption (underground and surface);
- Consumption of contaminated food grown on the fields or affected fish;
- For irrigation, contaminated water was used;

From the sources of pollution, radionuclide migration begins in the hydrographic network and in groundwater, an aureole of pollution spreads over tens of kilometers (figure 2).

[41] (Voitsehovich O.V. 2012, 30)

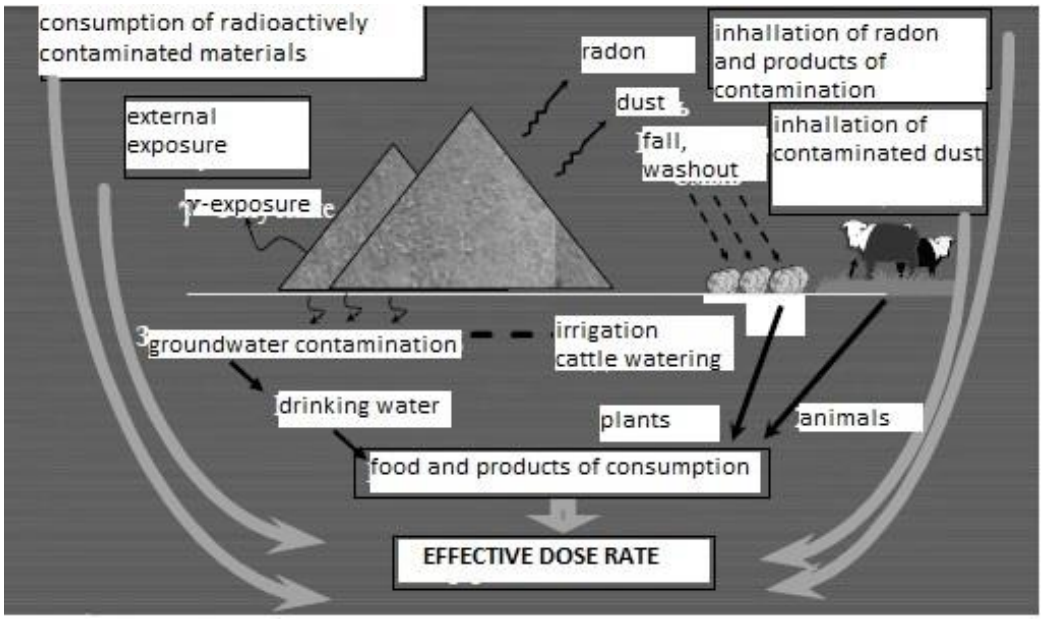

Figure 2. Consumption of radioactively contaminated materials.

The IAEA identified wastes of uranium legacy as a source of environmental pollution observed at the local level outside of the former production facilities, and vulnerability of tailings' storages, threatened by landslides from mountain slopes, water inflow to the ponds, and seismic areas. Historical data prove the repeated event of contamination in the downstream with likelihood for transboundary pollution. These incidents brought to local extrication of pollution from Min-Kush in 1956, Mailuu-Suu in 1958, Ak-Tyuz in 1964 and industrial region of Sumsar-Shekafar in 1994.

Hence, the rehabilitation of uranium sites represents a general interest for the Central Asian states and related international organizations.

The Central Asian region attracted the note of several international organizations to the issue associated with uranium tailings. Uzbekistan, Tajikistan, Kyrgyzstan, and Kazakhstan asked the IAEA in 2004 to provide an expertise and technical assistance to address a problem of legacy from former uranium industry.

An IAEA responded to the request by initiating several projects in these countries. At the same time, there were launched projects of several other institutions in parallel to IAEA. Projects aimed to address uranium legacy matters were run by European Bank for Reconstruction and Development, World Bank, European Commission on Aid Cooperation (EC-AIDCO), UNEP, UNDP, OSCE and the NATO.

Abovementioned organizations tried to address uranium problem from different aspects, which were corresponded to the general objective of reducing the negative impact on the health and environmental risks. However, they were not coordinated by the one body but followed integrated task to optimize resource management and strengthen the political impact.

All organizations working in the Central Asian region recognized the need for integration. Particularly in 2008, the UNDP together with the Kyrgyz Government proposed various international organizations to join the campaign to address problems posed by the uranium tailings in the region. According to

the agreement among involved international organizations and delegates of the concerned states, the problem supposed to be approached at the regional level.

The UNDP Office in Bishkek in April 2009 sponsored a regional conference, following by the IAEA conference on "Remediation of Land Contaminated by Radioactive Material Residues" which held in Kazakhstan. During the conference countries proposed 60 projects from various institutions. Thus, Kyrgyzstan proposed 33 projects, 2 projects came from Kazakhstan, 15 from Tajikistan and 9 from Uzbekistan, the Eurasian Economic Community (EurAsEC) submitted 1 project proposal. The volume of requested financial support counted around 236 million USD.

Project proposals aimed to strengthen infrastructure of regulation, development of socio-economic situations of the people neighboring the legacy sites, healthcare and environmental monitoring and remediation of legacy sites.

In June 2009 the UNDP also held an international forum in Switzerland named as "Uranium Tailings in Central Asia: Local Problems, Regional Consequences, Global Solution" in order to raise knowledge of international community regarding the uranium legacy problem in Central Asia.[42]

As it was indicated the development model of the USSR for Central Asian region based on construction of large-scale irrigation systems in the region

[42] https://www.kp.ru/online/news/505767/

allowing it to grow as main manufacture of cotton as well as mining and processing industry to expand. Particularly, the Ferghana valley was managed by the Soviet Government to become one of the main metal production sources and mining of uranium ore, scouting about 50 reserves within the region.

However, the tailing dumps of active and closed mining enterprises constituted several risks due to the position along water routes, vicinity of cities to transboundary areas, vulnerability to natural perils and previous records of accidents. A number of incidents have been reported regarding at waste storage of the lead treatment plant in Sumsar and uranium processing plant in Mailuu-Suu when flooding washed off tailing dams. Thus, natural disasters and accidents could impact a population living far beyond the surroundings of a plants or tailings affecting the livelihood of people forcing for displacement.

A non-binding resolution of the United Nations General Assembly, issued in December 2013, requested an international community to support Central Asian states with cleanup and remedial actions. The European Union, the UN, the European Bank for Reconstruction and Development, and other donors over the decades have spent millions on various evaluations. Since 2009 to 2016 the United Nations in its General Conferences is encouraging Member States to participate in a multilateral initiative to remediate the uranium mining legacy

sites in Central Asia through the Coordination Group for Uranium Legacy Sites in IAEA.[43]

The most prominent one was the UN resolution No.68/218, which considering the outcome of the high-level forum in Geneva on 2009, recognized the global risk to the environment and the population and called international community to assist affected countries.

The resolution pointed out importance of regional cooperation in priority areas like improvement of legislative framework, management of radioactive and toxic tailings at safe levels, remediation of tailings, implementation of programs to improve the monitoring systems and raise public awareness, preventing people from gaining access to polluted materials.

In January 2017 the European Bank for Reconstruction and Development (EBRD) informed about establishment and progress of the nuclear safety fund, an agreement on which was signed with the Kyrgyz Republic and Tajikistan providing a legal basis to implement remediation projects in these countries.[44] The "Environmental Remediation Account for Central Asia" is aimed to support activities dealing with the uranium legacy of Soviet-era. The fund was

[43] GC(53)/RES/10 (2009) para 65; GC(60)/RES/9 (2016) para 108; GC(59)/RES/9 (2015) para 97; GC(58)/RES/10 (2014) para 90; GC(57)/RES/9 (2013) para 86; GC(56)/RES/9 (2012) para 64; GC(55)/RES/9 (2011) para 66; GC(54)/RES/7 (2010) para 54

[44] (EBRD January 2017)

established in May 2015 when the European Commission requested to finance projects on remediation of high-priority sites in Central Asian countries.

3.2 Uranium legacy as an environmental challenge for Kyrgyzstan

The Kyrgyz Republic is a former USSR country, located in Central Asian region and landlocked country with total area of 199,951 km^2. The country's plentiful water resources and mountainous terrain enable it to produce and export large quantities of hydroelectric energy. It is bordered by Kazakhstan to the north, Uzbekistan to the west and southwest, Tajikistan to the southwest and China to the east. The regions of the republic are characterized by a large number of landslides, which can become more active.

The Kyrgyz Republic is a party to the Treaty on the Non-Proliferation of Nuclear Weapons, opened for signature in London, Moscow and Washington on July 1, 1968 since July 5th, 1994, as well as the 134th member state of the International Atomic Energy Agency. Since March 2007, a member of Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

According to the IAEA Classification of Radioactive Waste,[45] the mining of thorium or uranium ores belongs to the primary phase in the nuclear fuel cycle.

[45] (IAEA 2009, 34-35)

The materials which were separated and participating in further processing will be stored in the tailings. Such tailings generally contain elevated levels of naturally occurring radionuclides. Due to it tailings required to be managed as radioactive waste for safety reasons and radiation protection purposes.

The richer ores from which thorium or uranium were separated should be sent to mills for processing, where generally entails crushing and chemical processing. Tailings from processing contain significant amounts of hazardous chemicals, including heavy metals such as copper, arsenic, molybdenum and vanadium, which according to the standards should be considered in assessing the safety management.

Although the radioactivity levels of waste have low level the quantities left at deserted mining are huge. The left-overs, looking like liquid mud pumped into a tailings dam. After mining ceases tailings dams become hills of light sand which preserve thorium-230 in the tailings turns into radium-226 which in turn decays into radon gases.

In Kyrgyzstan, as stating the Ministry of Emergencies, there are 33 tailings and 25 dumps with a total waste of 12 million cubic meters.[46] As the UNDP assessed the ongoing processes of climate change are accompanied by the exacerbation of dangerous natural disasters, expressly tides and mudflows,

[46] (KG MES 2016)

landslides in areas where located uranium facilities and tailings with radioactive wastes, respectively, the threat of their destruction with disastrous environmental consequences of a transboundary scale is growing.[47]

The total area of territories exposed to varying degrees of radioactive contamination reached 6,000 hectares, where 145 million tons of radioactive wastes are concentrated. An amount of wastes in tailings is 75 million cubic meters, the total quantity of mountain dumps is 620 million cubic meters, covering area of 1950 hectares. Majority of these sites are situated in the basins of Naryn, Mailuu-Suu, Sumsar and Chu transboundary rivers, posing a considerable hazard factor for Kyrgyzstan, Uzbekistan, Tajikistan and Kazakhstan, with direct risk for more than 5 million population.

Cumulative risks from Kyrgyz mines threatening the Ferghana valley

Site	Man-Induced Risks	Natural Disaster Risks	Cumulative	Transboundary Risk
Mailuu-Suu	high	high	**high**	**high**
Sumsar	high	medium-high	**high**	**high**
Shekaftar	high	high	**high**	**medium**
Kan	high	medium-high	**high**	**high**
Kadamjai	high	medium-high	**high**	**high**
Khaidarkan	medium	medium-high	**medium-high**	**medium**
Kyzyldzhar	low-medium	medium	**medium**	**medium**
Tyoo-Moyun	low	medium	**low**	**medium**

Source: after Djenchuraev, 1999: 84; updated on the basis of ENVSEC consultations in 2004

Figure 3. Cumulative risk assessment

Tailing facilities, as indicated, are posing a menace of compound environmental pollution. The hazard coming from the tailing dump in the basin of Mailuu-Suu

[47] (UNDP 2012, 98-102)

river is considered as the highest (figure 3). The condition deteriorated due to the case that the tailing was used as a storage area for samples of metallurgical uranium ores as well as untreated ores coming to Mailuu-Suu processing complex from other countries.[48]

According to the Law of Kyrgyzstan #89 from November 13, 2001 "On production and consumption of wastes," wastes are divided into three main types – waste of consumption, production and radioactive. A significant volume of radioactive wastes in Kyrgyzstan and its accumulation occurred due to an operation of enterprises working in mining and processing uranium industry during the 1940-50s. Tailings were closed in 1966-1973 and the long-term measures on protection from landslides, flood and mudflow were not considered during designing and construction of tailings. In addition, almost all of them are located within the boundaries of settlements or directly near people's places of residence (Min-Kush, Kaji-Sai, Shekaftar, Mailuu-Suu, Ak-Tyuz, Sumsar, Kan) as well as in the basins of transboundary rivers (Mailuu-Suu, Naryn, Chu, Sumsar), which are a significant factor of hazard for both Kyrgyzstan and neighboring countries.

[48] (Iliasov S. Yakimov V. 2009)

The present state of the tailing dumps is of some concern and tailings like Sumsar, Shekaftar, as well as Mailuu-Suu, Kan and Sovetskoye located in the increased seismicity zones.[49]

In 1991 to ensure their maintenance in a safe condition and carrying out of the necessary measures for rehabilitation and remediation, tailing and dumps were given under the jurisdiction of State Corporation "Kyrgyzaltyn," and since 1997 they have been assigned to the joint stock company Kara-Balta Mining Complex. Later in 1999 the Government of Kyrgyz Republic transferred tailings to the balance of Ministry of Ecology and Emergencies. From 1993 to 1999, emergency repair work and ongoing maintenance operations were conducted sporadically. Due to untimely works, most of the tailing dumps have been exposed to hazardous natural processes.

In case of destruction of tailings, especially in the Mailuu-Suu region, it can lead to an ecological disastrous situation not only in the territory of Kyrgyzstan with the impact to the neighboring republics. To solve the problems associated with the tailing dumps, the Ministry has taken certain measures. A program of actions has been developed to ensure the safety of tailings with an estimated cost of remediation for each of them.

[49] (KG MES 2017, 715)

Currently, in the territory of Kyrgyzstan there are about a thousand marked abnormal sites with concentrations and radioactive testimonies in closed mines, mountain dumps, tailing dumps, as well as inadequately studied areas. Tailings and dumps according to the national security concept also considered as potentially dangerous objects that may be subject to terrorist acts.[50]

Paula Humphrey and Margarita Sevcik analyzing potential hazards associated with radioactive wastes of uranium tailings in Kyrgyzstan reflected one more issue which was less discussed as a security risk that could be conceivably posed by these sites. Particularly, they admit that "highly radioactive material, which could be used to produce radiological dispersal devices (RDDs or also known as "dirty bombs"), can be present inside of the tailings and in abandoned equipment at the tailing sites. "Both the tailing impoundment sites and so-called "orphan" sources, which could contain reactor-produced isotopes might present security risks if left unmonitored."[51]

The analysis shows that the number of emergencies in the country does not decrease, it rather shows a tendency to increase, where mainly large losses are caused by mudflows, strong winds, snow avalanches, groundwater flooding, transport accidents, fires, and a threat from toxic and radioactive tailings.

[50] (#357 Decree of KR 2/06/2012, Sections 3, 5)
[51] (Humphrey Paula Sevcik Margarita 2009)

According to the assessments, there are 5000 landslips, 3103 mudflows, more than 30 thousand snow-melting spots, about a thousand of which are causing threat, 330 dangerous lakes of various hazard categories and objects with toxic and radioactive waste production. All this represents a high risk of transboundary environmental disasters occurrence, including radiation-hazardous ones, including Kyrgyzstan, Kazakhstan, Tajikistan and Uzbekistan.[52]

In order to minimize the risks associated with uranium wastes there were reconstructed hydrotechnical protective structures of 6 tailing dumps in the framework of projects provided by the World Bank, IAEA, UNDP, OSCE, TACIS. Enlarged objects allowed to transfer 2 mountain dumps, 1 tailing into the in the body of others, which will reduce the number of contaminated foci.

Moreover in 2014 there was developed an Interstate Target Program "Remediation of territories of Eurasian Economic Community (EurAsEC) member states exposed by uranium mining operations" as a result of joint efforts and establishment of common systems ensuring radiation safety of EurAsEC member states by the State Corporation Rosatom, Federal Medical Biological Agency (FMBA of Russia), in conjunction with the Interstate

[52] (#120 Decree of KR 9/06/2012, Section 3)

Working Group. Within the framework of this Program, it is envisaged to carry out remediation measures of uranium tailings during the period 2013-2018.

As it can be seen the rhetoric of the problem with uranium tailings and hazard was discussed more than last decades and continues to be as one of the important agendas in Kyrgyzstan as well as all Central Asian region and worldwide.

The problem of radioactive wastes remains in every place where uranium is mined, or where nuclear power plants operating, despite the level of development of the country. In the countries like Niger, Namibia, USA Canada, Australia, Germany, France, China, Russia, UK, Ukraine and Central Asia. Nevertheless, the problem of radioactive wastes still taking a significant place among global environmental issues.[53]

However, in the European countries which shared the same history of membership in the USSR, like the East Germany, uranium wastes stopped to be one of the main environmental security issues. But the case of Kyrgyzstan is different. It is not benefiting from uranium mining as well as doesn't have the financial and technical capacity, including special national operator dealing with remediation measures. All burden lies on the Government and related bodies to address this issue during the last 25 years.

[53] (Nuclear-News 2017)

There is no practical national remediation system established in the Kyrgyz Republic of territories affected by uranium mining and processing enterprises. The international community, through the UNEP, IAEA and other international organizations, conducted works mainly aimed on environmental analysis and monitoring the health of people living close to the certain facilities.

At the same time, to solve problems related to uranium tailings in Mailuu-Suu, there was implemented a World Bank project on “Prevention of emergency situations” with cost $10.95 million, which included most significant risks prevention of the from radioactive influence from the Mailuu-Suu tailing dumps in $7.4 million.

There were also conducted works to ensure the temporary secure condition of tailings the Min-Kush village. In 2007, to ensure the geotechnical stability of the tailing dumps and restoration of highland ditches, roads, and protective covers, emergency recovery work was carried out in tailings amounted 215.2 thousand soms at the expense of the national budget.

In 2005, the project of the International Scientific and Technical center “Demonstration of uranium tailings in the village Kaji-Sai” for the amount of $ 400 thousand. There were performed works on the initial stage of remediation of the tailing dumps. The estimated cost of the second stage of remediation (full) assessed in $3.4 million.

In 2007, the tailing dump in the village. Kaji-Sai carried out emergency-restoration work for 630.8 thousand soms in expenses of the national budget.

3.3 Evolution of the environmental security discourse and paradigm shift

As it was considered in the Chapter 2, environmental issues mainly emerge under the concept of national security and regulated by its rules and considerations. However, representatives of the new approach indicated that environmental topics cannot be solved by only one country. It doesn't have bounds by territory and need for support of International Community and Epistemic Community represented by international organizations. Otherwise the environmental problem can deteriorate and in the case of transboundary pollution lead to the political conflicts with neighboring countries.

Considering abovementioned and long-term uranium legacy problem of Kyrgyzstan, we will try to answer the question on the reason and origin of protraction to address this issue. In order to understand this a historical evolution of the discourse will be reviewed.

On the 31st of August 1991, the Kyrgyz Republic declared its independence after collapse of the USSR. On June 23, 1993, the Government of Kyrgyz Republic decided[54] to transfer to the balance of State Corporation "Kyrgyzaltyn"

[54] (#263 Decree of KR 17/07/1993)

all tailings and mining dumps of the mining enterprises belonged to the former Ministry of Medium Engineering, Atomic Industry and Non-Ferrous Metallurgy of the USSR, established in the Kyrgyz Republic.

Basically, the Government ordered to the State Corporation to prevent possible contamination of territories of technogenic influence from industrial mining complexes by radioactive, toxic substances and heavy metals and improvement of the environmental situation in these regions.

In addition, the Government instructed "Kyrgyzaltyn" jointly with state committees and local administrative departments to carry out an inventory of all tailings of uranium production in one month and develop a set of environmental measures, including remediation work to ensure environmental security. And in order to ensure an implementation of ecological measures with the financial means, the State Corporation was commissioned [55] to create a centralized environmental fund through deductions of 1% from the prime cost of main products, produced at mining enterprises belonged to Kyrgyzaltyn.

At the same time, the State Committee on Economics, Ministry of Finance, State Commission under the Government of Kyrgyz Republic for Emergency Situations and Civil Defense were ordered annually transfer missing part of the

[55] (#802 Decree of KR 31/10/1994)

minimum need for remediation works in the areas of uranium tailings and dump sites.

The Government believed that the problem can be solved by the means of newly organized body and domestic budgetary support. However, after 4 years the Government of Kyrgyzstan appointed the JSC "Kara-Balta Ore Mining Complex" as responsible body for the maintenance, control and remediation of all tailings and dumps, parallel ordering the Ministry of Finance to provide the Kara-Balta Mining Complex with the necessary funds for stabilization of canned tailing dumps of uranium production in the Republican budget for 1998 and subsequent years.

Additionally, the Ministry of Foreign Affairs was tasked to begin negotiations with foreign investors on projects for servicing, monitoring and remediation dumps of uranium legacy sites, lead-zinc and other industries. It was noted that the negotiations should be conducted only with participation of the Ministry of Environmental Protection of the Kyrgyz Republic and the joint-stock company "Kara-Balta Mining Plant."[56]

On the international level, on January 17, 1997, the governments of the CIS[57] member states agreed on a long-term plan for developing cooperation in the

[56] (#630 Decree of KR 27/10/1997)

[57] Commonwealth of Independent States is an international organization designed to regulate relations and cooperation between states that were formerly part of the USSR, operating on a voluntary basis

peaceful use of atomic energy, improving the safety of nuclear installations, and preventing possible contamination with radioactive, toxic substances and heavy metals.

In the next year, the Government adopted an Initial Report of the Kyrgyz Republic on implementation of the International Covenant on Economic, Social and Cultural Rights' provisions. The report included concerns about the environmental situation and its impact on human health, as well as environmental disbalance in the republic. An international community was reported on emergency conditions of radioactive waste tailings and nuclear tests conducted in neighboring states.[58]

Due to the need of significant financial resources are needed to finally solve the problem of hazardous uranium waste and their technical content and to take adequate actions to prevent possible emergencies associated with uranium tailings and to intensify works on their stabilization the Ministry of Emergency Situations and Civil Defense was designated as the responsible for the maintenance, monitoring, and rehabilitation of tailing dumps in 1999. All tailings and mine dumps were transferred to the balance of Ministry of

[58] (#191 Decree of KR 13/03/1998, Part A, para 21)

Emergency Situations and Civil Defense as well as commitments on their remediation.[59]

In the same year, the Parliament adopts a law on radiation safety, where legal relations were prescribed in the field of protecting the environment and ensuring radiation safety of the population from harmful effects of the sources of radiation, including monitoring the state of tailing dumps and developing remediation programs.[60]

After building up the legislative basis the Government adopted in 1999 a state action plan for environmental health to ensure sustainable environmental development and control hazards. The plan noted that the data on toxic wastes are incomplete and the chemical composition of the wastes are not fully established due to the lack of a clear reporting format and inadequate submission by enterprises. This brought uncertainty in the further evaluation and clear understanding of threats.

The action plan highlighted that tailings were not remediated, and some are in an emergency condition. At the same time, it is necessary to carry out studies to assess the scope of work to compile a forecast of dangerous consequences in case of tailings destruction for the population of Kyrgyzstan and Uzbekistan living downstream.

[59] (#161 Decree of KR 23/03/1999)
[60] (#58 Law of KR 17/06/1999)

The situation was worsened by the ineffective control system due to the lack of modern equipment. Thus, the government set several basic tasks, among which were establishment of a unified monitoring system of radiation situation, conduct comprehensive radioecological research to identify contaminated areas near uranium tailings and strengthen the material and technical base for the operation and storage of radioactive waste sites. One of the important tasks included informing of the population about radiation situation in various regions of the country and measures to protect them from the negative effects of radiation.[61]

In 1999, the rhetoric of the problem of uranium tailings shifted to the regional context. On December 16, the Parliament of Kyrgyzstan held a special session and heard a report from the Government about the state of tailing dumps and their impact on the environment of Central Asian region and measures taken to ensure environmental security. The outcome of this session[62] was an order to negotiate with governments and parliaments of Russia, Uzbekistan and Kazakhstan on participation in financing of tailing dumps rehabilitation and ensuring their security. One more time was raised the need to intensify work on searching and attraction of foreign investors, to apply to the international funds

[61] (#611 Decree of KR 1999, Sections 3.3, 3.5)
[62] (#1056-1-18 Resolution 16/12/1999)

for the rehabilitation of tailing dumps, including regular environmental monitoring.

In 2001, in addition to the law on radiation safety, the parliament adopted a more specific law on tailing dumps, aimed at ensuring the safety of people and the environment. The law defined the direct state policy at all stages of management of tailing dumps, as well as the functions of state authorities and local governments.

Interesting, and no less important, is the fact that this law put the legal basis for financing of uranium tailings management, as it contained an article 14 on financial resources and sources, including targeted extrabudgetary funds, loans and receipts from foreign citizens and legal entities.[63] Before adoption of this law there were no targeted accounts and procedures on financing activities regarding remediation of uranium tailings, despite numbers of public statements on this issue.

Also, it is necessary to consider, that environmental security was also included into the concept of national security of Kyrgyzstan.[64] Taking into account the mountainous location of the country, threats to the environmental stipulated by

[63] (#57 Law of KR 26/06/2001)
[64] (#221 Decree of KR 13/07/2001, Sec. 3)

a vulnerability for natural and anthropogenic impact and irrational economic activity. In general, threats can be grouped into:

- the negative impact of a human economic activity on the environment;
- the insufficient effectiveness of the system to prevent and eliminate natural/man-made environmental disasters;
- emergency incidents related to destruction and harming the environment;
- irrational use of natural resources, as well as funds allocated for the management of environmental disasters;
- increasing vulnerability of public health from the negative impact of the environment;
- an unfavorable ecological situation in the territory of neighboring countries;

One of the most important factors included a statement of an unsatisfactory condition of uranium tailings and potential danger of possible sabotage at tailings and other strategically important facilities.

Concerns of sabotage were caused by the fact that in 1999-2000th armed groups of militants from the Islamic Movement of Uzbekistan tried to penetrate into the territory of Uzbekistan from Tajikistan through the lands of Kyrgyzstan. During the clashes with the armed forces of Kyrgyzstan the terrorist groups were eliminated.[65]

[65] (Youtube 2014)

In addition, on May 12, 2002, the landslide "Tektonik-1" became active in the Mailuu-Suu city. The descended landslide of 300,000 m^3 blocked the riverbed of the Mailuu-Suu River and caused a threat to the formation of an artificial lake capable to demolish radioactive storage located along the river and could lead to contamination by radioactive waste. At that time, the Government of Kyrgyzstan sent a US$1 million grant provided by the World Bank for the activities on unloading landslides and rehabilitate tailings in the mountains of Mailuu-Suu to prevent landslides.[66]

In 2002 the Government of Kyrgyzstan received a support from European Commission within the framework of TACIS program[67] in the amount of 500,000 euros. There were carried out researches of tailing dumps, presenting an increased danger. The aim of the program was to assess the environmental situation in the vicinity of the tailing dumps and develop measures to ensure security and safety at tailings. It was also planned to develop a system for monitoring and analyzing disastrous factors, strengthen control over potential sources of man-made disasters (tailing dumps, transportation of toxic and explosive loads, etc.)[68]

[66] (#460 Decree of KR 5/07/2002)
[67] (Commission European 14/09/1992); here TACIS – Technical Assistance for the Commonwealth of Independent States
[68] (#269 Decree of KR 8/05/2003, Sections 440, 497)

In 2003 on the base of bilateral cooperation, Kyrgyzstan and Uzbekistan decided to coordinate joint activities for the remediation of tailing dumps and mining dumps to enhance environmental safety in the transboundary territories.[69]

Prime Minister Nikolai Tanaev and the Director of the OSCE Conflict Prevention Centre, Lamberto Zannier during the meeting in April 2003 hold discussions regarding the uranium tailings. The event was organized by several actors which included an OSCE Centre in Bishkek from the side international organizations, Ministry of Ecology and Emergencies of Kyrgyz Republic as a regulatory authority and non-governmental organization Central Asian Regional Economic Cooperation Institute.

The prime-minister acknowledged that the country is not in a position to achieve an environmental security on its own regarding the problem of radioactive wastes in the Mailuu-Suu region. Kyrgyzstan after the collapse of the USSR counts to the help of all neighboring countries including Russia for the solution of this problem.[70]

After the (tulip) revolution in 2005 in Kyrgyzstan, the Government was changed and main works regarding uranium legacy sites stopped. Only in 2007, the President's Decree approved the Development Strategy of Kyrgyzstan for

[69] (#607 Decree of KR 2003)
[70] (OSCE 2003)

2007-2010, reflecting the goal of integrated security of the population and the territory against natural disasters in the country and in the Central Asian region. There were set tasks on remediation of tailing dumps necessity to carry out engineering researches and prospecting works on dangerous sites.[71]

Sharp changes in the rhetoric of the environmental security concept occurred also in 2007, when the President assumed environmental security not just an integral part of the national security but also an indispensable condition for sustainable development, serving as a basis for conservation of nature and maintaining appropriate quality of the environment. In this regard the Development Strategy of the country included several priorities as reforming all sectors of the national economy towards the use of natural resources in environmentally sound manner.

Due to this a new concept of environmental security was developed in the context of sustainable development and defined step-by-step implementation of provisions for ensuring the environmental security:

- the first stage (2007-2010), socio-economic development considering the potential capacity of ecosystems;
- the second stage (2010-2015), reduction of the level of environmental pollution, preservation and restoration of the nature;

[71] (#249 Decree of KR 16/05/2007, Sections 579, 580)

- the third stage (2015-2020), improving the quality of environment and achieving sustainable nature management.[72]

The decree stated that, sustainable development of the Central Asian region, as well as regional and national security can be ensured only if natural ecosystems are preserved and appropriate quality of the environment is maintained. It pointed the necessity of consistent implementation of a unified state policy in the field of environmental protection and rational use of natural resources.

For this purpose, the Government ordered to establish of the organizing committee to prepare and hold an International High-Level Forum to discuss problems related to uranium and other tailing dumps containing highly toxic waste located on the territory of Kyrgyzstan and to develop measures to prevent possible environmental disasters.[73]

As a result of international cooperation between IAEA, UNEP, World Bank and Japan there were implemented 2004-2012 a project aimed to reduce the hazard from radioactive tailing dumps in Mailuu-Suu and its impact on public health, water resources, flora and fauna.[74]

[72] (#469 Decree of KR 16/10/2007, Sections 1, 3.2, 3.3.6.1.)
[73] (#294 Decree of KR 13/06/2008).
[74] (#599 Decree of KR 2011)

With the assistance of the Czech Republic Government, an environmental study and the liquidation of the former ore concentrate of the Ak-Tyuz were conducted in the area of tailing dumps.

In 2009 the President Bakiev in his speech pointed that to improve the efficiency of addressing radioactive and toxic tailings, there should be established a specialized State body for radioactive and chemical waste management under the Government of Kyrgyz Republic. Moreover, he highlighted priorities raised on increasing effectiveness of integrated security of population and the territory from natural disasters, establishment of a monitoring and forecasting system of natural hazards as well as strengthening and improving the state emergency services.[75]

An indicated policy was not fully implemented due to the revolution, which took place on April 7th, 2010 and ethnic conflict at same year, when the policy of the country was mainly focused on restoration of Governmental functions, economic and political recovery, including return of the legal basis of the state.

On 24-25 October 2012 in Bishkek (Kyrgyzstan) was held an international conference named "Uranium tailings in Central Asia: joint efforts to reduce risks." The event was initiated by the Government of Kyrgyzstan and the local UNDP Office in cooperation with the governments of Central Asian countries

[75] (President Speech of the 16/01/2009)

and other interested countries, the IAEA, UNDP, EurAsEC, the State Atomic Energy Corporation Rosatom (Russia), international organizations and financial institutions, and the expert community.

Representatives of EurAsEC and IAEA announced about to implementation of the program on remediation uranium tailings in Kyrgyzstan and Tajikistan. In general, the program, which is designed until 2018 accumulated $38.5 million dollars, where 15% is provided by Kazakhstan and 5% by Kyrgyzstan and Tajikistan respectively and 75% by Russia.[76] The program was drafted under the decision of EurAsEC.

Symbolically, in June 2012, the Government of Kyrgyzstan adopted Decree on transforming of the Agency for Atomic and Radiation Safety under the Ministry of Emergency Situations into the Agency for Management of Tailings, responsible body for remediation issues and control of uranium tailings and radioactive wastes.[77]

This is not the only example of international cooperation. Since 2010 there are conducted active works under the IAEA and UNDP leadership. Particularly, IAEA developed a Strategic Master Plan for Environmental Remediation of Uranium Legacy Sites in Central Asia until 2018.[78]

[76] (news Fergana 2012)
[77] (#406 Decree of KR 12/06/2012)
[78] (IAEA 2012)

As well as EBRD established an Environmental Remediation Account for Central Asia (ERA) in 2015 to mobilize donor funds and assist Uzbekistan, Kyrgyzstan, and Tajikistan to remediate the most dangerous uranium tailing sites left by the USSR. ERA was established under the initiative of the European Commission and became operational in 2016.[79]

Since 2008, the Norwegian Government provided support to the regulatory authorities in Central Asia in radioactive waste management and strengthening regulatory infrastructure to identify gaps in the regulatory framework and draft relevant requirements to ensure the protection of personnel, and environment during the planning and conducting of remedial action.[80]

The Norwegian report concluded with several findings about Kyrgyzstan, where highlighted an absence of state policy or strategy in the field of radiation safety and waste management in place as well as coordination of actions between various regulatory bodies, absence of safety assessment of operating enterprises or installations where radiation sources are produced or stored, including weak system of authorization of activities, inspections and enforcement of the regulations.

The state actors assumed that the state does not possess adequate technical and financial potentials to ensure proper support and remediation of the facilities

[79] (EBRD 2012)
[80] (Sneve M. Romanenko O., Solomatina A. 2013, 38)

storing radioactive wastes and contaminated areas. They actively held meetings with representatives of international organizations, such as the World Bank, Asian Development Bank, OSCE, UNDP, IAEA and others.

As a result, the funding for the tailing dumps projects began to come from international organizations and donor countries. The Ministry of Emergency Situations implemented a World Bank project "Prevention of emergency situations" to solve problems related to uranium tailings in Mailuu-Suu.

By the decision of the EurAsEC Interstate Council (at the level of the heads of governments) on April 5, 2012 was approved the Interstate Target Program "Remediation of the territories of states exposed by uranium mining operations." This program provides for the remediation of the tailing dumps of the villages of Myn-Kush and Kaji-Sai for the period 2013-2023.

Within the European Commission, the Government of Kyrgyz Republic on December 30, 2011, approved the project of the European Union "Establishment of legislative and legal framework for the restoration of uranium burial sites in Central Asia," including by the project participants from Mongolia, Tajikistan and Uzbekistan as well. The goal of the project is to promote coordinated, safe and cost-effective management of the sites of former uranium production in Central Asia, which is planned to achieve through establishing a unified regulatory framework, river basin monitoring and

information exchange, assistance in expanding analytical capabilities for characterizing soils, the behavior of pollutants and providing necessary trainings.

Additionally, in 2012, the European Union provided funds for the project "Integrated Environmental Impact Assessment (ECOS) and the Feasibility Study for the remediation of former uranium production facility in the villages Min-Kush, Shekafar."

In 2015 the Government of Kyrgyzstan approved the European Union project "Management and remediation of high-risk uranium sites in Central Asia (Mailuu-Suu)," aimed to develop Environmental Impact Assessment and a Feasibility Study, which will serve as a basis for determining the remediation options in Mailuu-Suu.

Since 2017 approved agreement with EBRD in the frame of environmental account for remediation of Min-Kush and Kaji-Sai tailings. On September 21, in New York the President of Kyrgyz Republic Almazbek Atambayev opened a high-level event called "People and the Planet: Central Asia Calls for International Solidarity" with speech on the initiative of Kyrgyzstan and the European Union. He called for international solidarity to address the environmental problem posed by the uranium legacy and donors' support of the Fund created under the EBRD.

Referring to the findings from the Chapter 1, it is possible to identify an important role of the epistemic institutions represented by the international organizations which helped to build scientific base for the problem and leverage political assets of the country in international level. Generally, the evolution of the securitization of the uranium problem in Kyrgyzstan can be considered in the three stages when it developed from national concern to the global (figure 4).

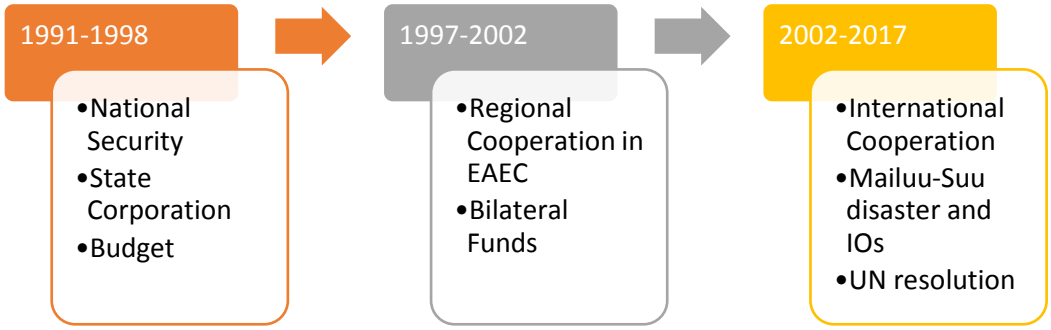

Figure 4. Evolution of the uranium environmental problem

As well, there is an evidence of the neoliberal approach to the environmental security, which stated that environmental issues are not limited within the borders of one state and needs cooperation to resolve it. In the frame of uranium legacy topic, environmental question evolved from the national security issue to the regional and later on accepted by the international community calling members for the support in addressing it.

CHAPTER 4. CASE STUDIES IN KYRGYZSTAN AND GERMANY

4.1. Mailuu-Suu case from the risk to action

As an example, illustrating the errors of the initial stage of uranium mining, let us consider the geoecological situation in Mailuu-Suu. The city of Mailuu-Suu is located in the Jalal-Abad district of Kyrgyzstan and populated with 26000 inhabitants. In 2009 news, with the reference to the Blacksmith New York Institute dealing with habitat protection, reported that the city of Mailuu-Suu in Kyrgyzstan indicated as a third most polluted city in the world. The first place in the list were dedicated to Chernobyl (Ukraine), whose population was evacuated from the nuclear accident zone. Second place – the city of Dzerzhinsk (Russia), which Blacksmith calls "the most chemically polluted settlement" of the planet.

The former Soviet-era uranium plant in Mailuu-Suu which each year produced and processed more than 10,000 metric tons of uranium ore products from 1946-1968, mostly to supply the USSR's nuclear weapons program with fissile material. Although, the country does not possess a nuclear weapon, it has 1,96 million cubic meters of unsecured radioactive waste, which in combination with a high seismic activity of the region, endangers with pollution of drinking water

stocks in the fertile and densely-populated Ferghana valley, stretching throughout Kyrgyzstan, Uzbekistan, and Tajikistan. [81]

United Nations Scientific Committee on the Effects of Atomic Radiation summarized some scientific observations about effects of uranium content in the water close to nuclear fuel facilities worldwide (figure 5). An analysis provided to the Assembly shows that the uranium content in the tailings of Mailuu-Suu are much higher than living area.[82]

Country	Location	Type of plants	Sample number	Total uranium (μg/L)	^{238}U (mBq/L)	Reference
Brazil	Lagoa Real	Mining and ore processing	26	5.45 (0.1–259)	*67.6 (1.2–3 212)*	[C13]
Canada	Saskatchewan, Beaverloke Lake	Mining	22	100.8	*1 250*	[Y1]
India	Jaduguda	Mining and ore processing	33	3.2 (0.03–11.6)	39.7 (0.37–144)	[P8]
India	Jharkhand, Narwapahar	Mining	103	0.63 (0.10–3.75)	*7.8 (1.24–46.5)*	[R7]
India	Jharkhand, Bagjata	Mining	10	3.22* (<0.5–11.2)	*40* (<6.2–139)*	[G12]
India	Jharkhand, Banduhurang	Mining	10	2.15* (<0.5–27.5)	*26.7* (<6.2–341)*	[G12]
India	Jharkhand, Bagjata	Mining	40	*(<61–55.9)*	(<12.6–693)	[G13]
Kazakhstan and Kyrgyzstan	Kurdai (Kazakhstan) and Shekaftar, Kavak and Kadji-say (Kyrgyzstan)	Mining	10	28.2 (1.9–35.9) (1 525 in lake at mining pit)	*350 (23.6–445)* *(18 910)*	[U12]
Kyrgyzstan	Mailuu Suu	Mining and milling	25	0.28 (0.27–0.34) (6 820 for tailings)	*3.47 (3.35–4.2)*	[C32]
Nigeria	Jos plateau	Abandoned mining	5	0.10 (0.03–0.27)	*1.24*	[A22]
Nigeria	Abakaliki	Mining	20	2 (0–7)	*24.6 (0–87)*	[O2]
Portugal	Viseu, Quinta do Bispo & Cunha Baixa	Mining	12	*17.7 (1 km)* *0.5 (7 km)*	220 (1 km) 6.2 (7 km)	[C11]
Tajikistan	Taboshar & Digmai	Mining and milling	6	6.95 (3.4–92)	*86.2 (42.2–1 138)*	[S28]
USA	Karnes County, Texas Pana Maria	Mining and milling	6	19.7 (14.8–95)	*244 (183–1 178)*	[M18]
USA	California Juniper		9	3.35 (0.02–52.37)	*42.2 (0.25–649)*	[K8]

Source: UNSCEAR 2016 Report "Sources, effects and risks of ionizing radiation"

Figure 5. Overview of uranium content in water close to nuclear fuel facilities worldwide

Scientists from the Institute of Nuclear Physics of Uzbekistan in the works noted, that several former uranium mining facilities in Kyrgyzstan are closely positioned to the Uzbekistan's borders. One of the biggest decommissioned uranium legacy sites is situated from the border of Uzbekistan in distance of 8

[81] (Institute Blacksmith 2011)
[82] (UNSCEAR 2017, 377)

km away and accounts 50 times higher risk to the population of the latest rather than to the population of Kyrgyzstan (Danilova E.A. et al. 2011, 177).

Radioactive tailings produced during the uranium ore processing have been deposited near geological red lines around the city, without attention to hydrological and geological conditions or human health risks of people, living there. 36 waste dumpsites were scattered around the area holding about 1,960,000 m^3 of unsecured mining waste with radioactive emanation. 23 of them located within the city. Observation of data during 2006-2008 showed that in more than 50% of the selected samples of surface and groundwater, uranium levels exceeded the WHO safety standard (figure 6).[83]

The system of central water supply of the Mailuu-Suu and villages located lower stream of the river from the objects of former uranium production and processing (tailings, dams and etc.) are imperfect, in some regions even absent. In this sense establishment of the effective monitoring program of the ground waters and river Miluu-Suu are important.

In 1958 the radioactive mudflow caused extensive contamination and destruction. In Mailuu-Suu, the tailing pond number 7 broke and released about 600,000 cubic meters of materials consisting radiation to the river.

[83] (Voitsehovich O.V. 2012, 5-7)

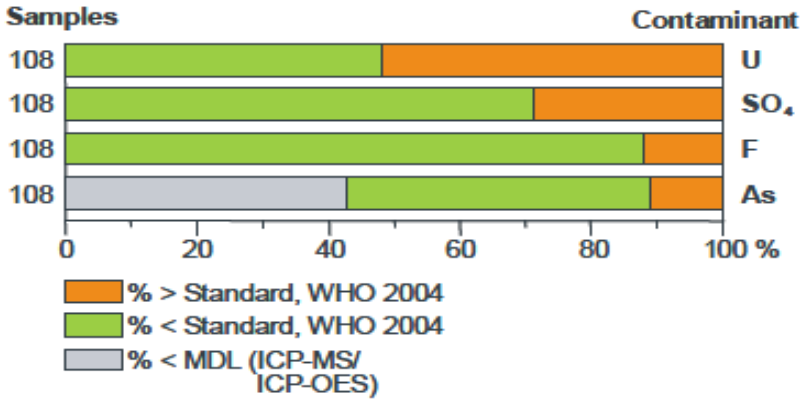

Figure 6. Sampling results from the ground and underground waters in Mailuu-Suu

According to the report of Blacksmith Institute "....in May 2002 a huge mudslide hindered the course of the Mailuu-Suu river which threatened to submerge another toxic waste site. In April 2005 the Obschestvenny Reiting newspaper reported that after another earthquake and landslide, about 300,000 cubic meters of material fell into the Mailuu-Suu River near the uranium mine tailings."[84]

Here, in the Mailuu-Suu River, 30 km from the border with Uzbekistan, and streams Karaagach, Aylampa-Sai and Shamaldy-Sai on the slopes of the mountains were deposited 23 tailing dumps with an entire quantity of 1495 thousand m^3 of radioactive wastes and in the river Kulmen-Sai 13 mountain

[84] Report of the Blacksmith Institute http://www.blacksmithinstitute.org/projects/display/129

dumps of sub-standard ores with the volume of 7952 thousand m^3. radioactive waste was deposited.[85]

This area is particularly dangerous due to its proximity to settlements, underground reserves of natural gas and oil, and the very high likelihood of various types of natural disasters, such as earthquakes and landslides. All existing tailing dumps were canned in 1966-1973 without remediation. From 1991 to 1998 the works on repair and maintenance of tailings were carried out sporadically and in insufficient quantities.

Based on data of the Ministry Emergency,[86] the process of landslide formation is increasing every year. A sharp activation of landslide, mudflow, erosion on the slopes adjacent to the tailing dumps, deficit of funds for repair and remediation led the emergency close situation at some tailings. The destruction of these tailings can lead to entry of the of radioactive material not only to Mailuu-Suu river, but further to the densely populated Ferghana valley, and most importantly, to the basin of the river Syr-Darya, which can lead to a regional environmental disaster.

The Ministry of Emergency Situations of Kyrgyzstan together with the Ministry of Emergency Situations of Uzbekistan worked out the scenario of contamination with radioactive waste, as a result of the breakthrough of

[85] (KG MES 2017, 176-177)
[86] (KG MES 2017, 177)

radioactive tailing dumps in Mailuu-Suu. On the territory of Kyrgyzstan, in the zone of possible defeat are about 26 thousand people, on the territory of Uzbekistan about 2.4 million people, on the territory of Tajikistan about 700 thousand people, in the territory of Kazakhstan about 900 thousand people.

The long-term pollution with radionuclides will undergo vast zones of irrigated agriculture areas of Uzbekistan, Kazakhstan, and Tajikistan. In addition, such large watercourses as Kara-Darya, Syr-Darya will be contaminated. It should also be taken into account that the drinking water supply of the population is carried out from these rivers or canals originating from rivers. Even in case of water supply from the sumps, groundwater can be polluted with radiation. Also, huge harm can be caused to the environment and biodiversity.

An international society expressed a clear interest in systematic remediation of the legacy sites with socially and environmentally responsible manner in accordance international practices and standards. To achieve this task, it was highlighted national legislation harmonization and strengthening of regulatory infrastructure according to international standards, building environmental evaluations prior the initiation of remediation on uranium legacy sites, deliver adequate educational trainings for the regulatory institutions, scientific organizations as well as impacted communities, improve safety assessments to

prioritize action plans of remediation and post-remedial monitoring system by building national analytical capabilities.

4.1.1 Remediation and projects

In order to remediate and protect tailing dumps of the uranium mining and reduce the impact of radionuclides from the canned tailings, there was implemented TACIS program from 2001 to 2003 which carried out research, engineering, survey and monitoring operation. The aim of the program was to assess the environmental situation near the uranium tailings and develop measures to ensure their safety using.

Under the TACIS project, funded by the European Commission, the Consortium of scientists represented from Belgium, Germany, France and Kyrgyzstan provided an assessment in the Mailuu-Suu uranium mining and milling area for radiation exposure. They evaluated necessary actions to be taken by the regulatory bodies to prevent environmental pollution exposed by heavy metals and radionuclides and prevent radiological contamination of the population in case of damage to dumps or loss of tightness of dams and propose adequate remedial options.

The project contributed to the overall objective on reducing radiological exposure and preventing environmental pollution. The comprehensive final

report prepared by the contractor provided a sound basis for a substantial follow-up project funded by the World Bank Natural Disaster Mitigation Project with financial support also from Japan, the Global Ecological Fund and the Kyrgyz Republic. The Contractor disseminated the results at various international conferences and supported the World Bank follow-up.

An implementation of the TACIS project showed an example of cooperation in two layers, between Government to Government level and later on which lead to the technical scientific collaboration level which allowed achieve several results on identification of radiological hazards and develop risk mitigation, and monitoring measures, exchange experience and evaluate recovery plans for the tailings to decrease the impact of a disaster scenario.[87]

As described earlier, possible direct or indirect impact posed by seismic or other environmental risks on some of the uranium tailings located close to Mailuu-Suu river cannot be excluded. In the past, in 1992 the tailing #17 was affected by the landslide called Tectonic. In this sense selected options of remediation should prevent unforeseen scenario as a non-negligible occurrence possibility.

Seismological risks which can trigger slope change and cause possible loss of tailings' structural stability, correlated with blockage of the river, should be

[87] (Vandenhove H. et al. 2011, 211).

ranked as probable in mid and long-term period on the basis of historical observations. There can be done a very little against movement of slope and seismic hazards in the critical parts of the Mailuu-Suu river cavity due to the natural character of the risks.

Hence, monitoring, control of access to the facilities and measures of emergency preparedness as well as physical recovery of reservoirs which are regarded as instable in current state with short and midterm significance but, nevertheless, necessary. (KG, 2017 #129, 38)

In addition, from 2004 to 2012, implemented the first pilot project in Central Asia “Prevention of emergencies,” funded by the World Bank, which covered only 8 of the 23 tailing dumps. The positive results of the projects are significant improvement of the environmental situation in the region, which has made it possible to ensure environmental sustainability, the population has received socio-economic benefits through the transfer of tailings and preventing the most significant risks from radioactive tailing dumps, natural hazards (landslides) and improving the management of emergencies.

However, the problem was not fully solved and based on the program documents (National Strategy for Sustainable Development of the Kyrgyz Republic for the period 2013-2017), the Government of Kyrgyz Republic is

constantly working to find donors for the next stages of work and reduce emergency risks associated with uranium tailings in Mailuu-Suu.

According to the Ministry of Emergency situations there are needs for:

1. Constant monitoring of the water conditions and bottom sediments of the river;

2. Restoration of facilities and conduct preventive and remediation works on a regular basis; Annual inspections and preparation of defective acts are necessary with the subsequent implementation of construction and repair of protective structures at all tailing sites.

3. Study of radiation situation with drilling of auger well;

4. Development and application of new technologies for tailings remediation and improvement of the ecological situation in the region.

4.1.2 Access to the information and building trust

According to Carius a perceived risk can be a powerful insecurity trigger and become a real threat, especially when the official information tempts from a shortage of reliability.[88] it is still necessary to deal with risks, even if measurable consequences of an accident may be restrained, as they are distinguished by the society. It especially becomes valid to emotionally charged

[88] (Carius Alexander and United Nations Environment Programme 2003, 30)

cases such as pollution with radiation, where a small-scale incident at a uranium site with a small actual influence may well create massive anxiety among the public. The effect will be increased if the threat has a cross-border character.

The public fund – Aarhus Centre[89] in Kyrgyzstan and other NGOs are operating in the city providing several trainings aimed providing several trainings to radiation security background, impact of uranium waste on the environment, principles of safe handling of radioactive waste, sanitary norms and rules in uranium production facilities, effect of radiation on the human body. As well as strengthen participation of stakeholders for remediation of uranium legacy sites.

Some inhabitants of the Mailuu-Suu city publicly pointed to the presence of illness like cancer and leukemia. They supposed that the cause of their illness come from uranium and government is not providing a full information about healthcare. For the people radiation and radon gases raises a big concern, as well as worries with wastes containing heavy metals. They believe that cadmium, arsenic and others accumulated in the drinking water. Some people pointed that even in the hospital they do not receiving information about related health problems or advise with restriction to visit tailing dumps.[90]

[89] Centre was established in the frame of Aarhus Convention environmental information and appropriate responsibility for its collection and dissemination.
[90] (Trilling David 2015)

Some locals try to oppose moving of the tailings, due to the lack of information and believe that illnesses can come from uranium influence due to uncovered tailings.

In turn representatives of hospital confirmed the rise in cancers, but insisted that it is not connected with Mailuu-Suu, claiming that a tendency of increasing cases of cancer observed all over the world.

Several times during official meetings, locals applied to parliamentarians to increase the amount of additional social benefits provided for residents of an ecologically polluted city.[91]

According to the journalist David Thrilling, the disbelief is catalyzed by a lack of information, combined with concerns about receiving support from the state. However, officials and donors considering an implanted project in Mailuu-Suu as successful which led to the enhancement of ecological security and safety for people, by moving some of the highest-risk tailings.

According to the available results of medical researches 65% of children who live more than 5 years in Mailuu-Suu have 2 or more background diseases (more often anemia, helminthic and parasitic infestations, physical development lag, thymomegaly) in combination with 3 or more chronic diseases (bronchopulmonary system, gastrointestinal tract, urinary system, congenital

[91] (SDPK 2017)

malformations (CHD). As it found, 52.6% of school-age children living in conditions of a stressful ecological situation (city of Mailuu-Suu) had a high medical and social risk of chronic diseases (ecological disadaptation syndrome): ecological disadaptation syndrome (75.5%), specific chemical and / or radiation hypersensitivity (12.5%), chronic intoxication (11.7%).

Risk of occurrence congenital malformations and other acquired diseases of the circulatory system in children living in Mailuu-Suu is associated not only with adverse environmental factors (x-contamination with uranium water), but also with medical, biological and social factors. [92]

On more assessment concluded that people living in the geochemical province and, especially, miners who previously worked at the uranium plant, has a relatively high accumulation of uranium in the teeth, and hence in the entire body. It is possible to draw a general conclusion that under the influence of climatic and technogenic factors, uranium is released from the tailing dumps, polluting the soil, water, plants, getting into the body of animals and humans. In the opinion of researchers, a problem arose when it was necessary not only to remediate uranium tailings and take preventive measures to prevent radioactive

[92] (Saatova G.M. Zhanturaeva B.T. 2016, 26)

elements in the human body, but also to initiate measures to eliminate these elements from the body in persons living near uranium tailings.[93]

Despite the action taken by government and NGOs there is still a high rate of concerns and necessity to build a trust among local population and government on the topics related from the social benefits to the healthcare.

4.2 Case of Wismut Schlema: Remediation as a Promoter of Regional Development

The reason of to choose Wismut case in Eastern Germany to compare with Mailuu-Suu case in Kyrgyzstan was based on the several criterias like historical similarity being USSR facility serving for the nuclear infrastructure, which left enormous amount of wastes due to the collapse of the Soviet Union. As well as both countries did not have any experience in remediation of uranium legacy sites and approached to the foreign technical and financial support. Doctor Manfred Hagen and his colleagues came to the is notable conclusion, saying that the remediation of uranium tailings in Germany proved that can serve as regional development promoter and provider of international "know how."[94]

The Soviet-German joint stock company SDAG Wismut extracted in excess of

[93] (R.R. Tukhvatshin A.R. Raimzhanov, A.A. Isupova, T.M. Topchubaeva, A.A. Kazieva, G.S. Attokurova 2017, 167)

[94] (Hagen M. Jakubick A. T. 2011, 110).

216 000 tons of uranium during the Cold War Era. On an extensive area of the Eastern Germany represented by Saxony and Thuringia there were located a number of the uranium mining and processing facilities (figure 7).

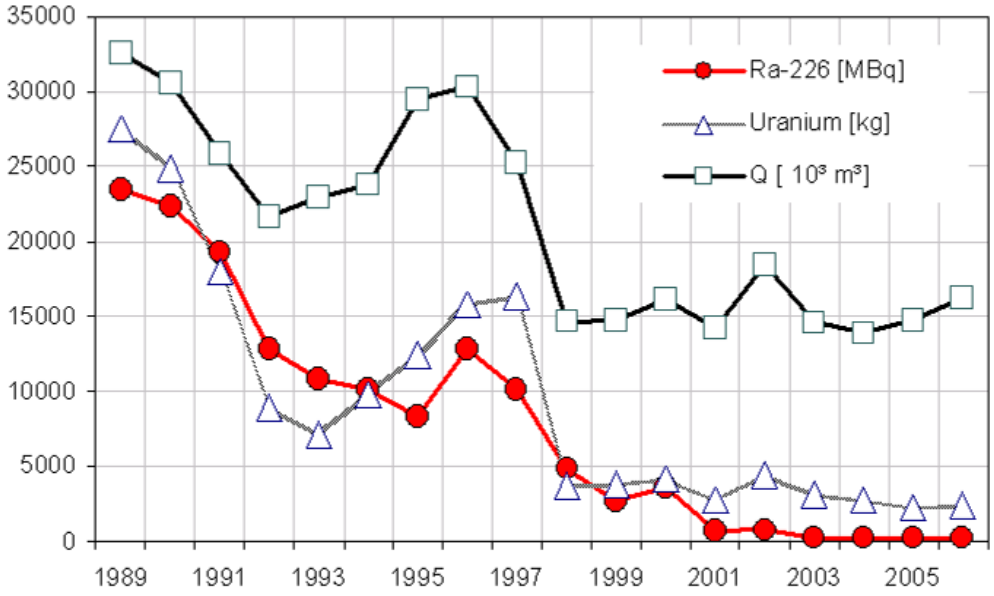

Figure 7. Discharge Volumes and Uranium/Radium Load in the Wismut Effluents

A main receiver of the uranium production was the USSR. Due to the low level of the grade of uranium ore at the majority parts of the mining areas, there was upheld an extensive production which generated one of the large uranium mining legacies in the world. In the late 1980s, the Soviet Government started to decrease the demand for uranium. After the reunification of Germany in 1988, the Government payed attention to the mining and decided in December 1990 to stop its operation for economic reasons. During the period of downfall of the GDR and German reunification the public and political pressure by

NGOs aimed to stop radioactive emissions from uranium production and clean-up of devastated areas. The central Government of Germany ordered to start the remediation and closing of tailings.

As it was mentioned, at the initial stage of the remediation program of Germany there was not any experience of uranium mining closure available in the country and to initiate remedial and engineering works without delay and simultaneously, there were performed a collection of data on the available international experience. On its results, Germany decided to approach to the expertise of US Department of Energy and Canadian related companies and institutions for cooperation.[95]

According to the Hagen and Jakubick, an implementation of remedial works, differently from in civil regular engineering projects, determined to be an iterant process including circles of feedback rather than a linear achieving of the tasks. The most concrete outcomes of remedial purpose are characterized by the restored land, stabilized and safely restrained piles of wastes and deposits in tailings.

Hagen considering analyzing an external projects experience came to a conclusion that post-remedial stewardship, as well as sustainability of remedial

[95] A Memorandum of Understanding was signed with the Canadian Ministry of Mines and Natural Resources,
MNMR and with Atomic Energy Control Board, AECB (the predecessor of the present Canadian Nuclear Safety
Commission, CNSC), May 1991.

results, can be best assured if the remediated piles and land put to productive use. It is suggested that the socio-economic impacts of the remedial works should not be included during definition of the goals of remediation beyond the health containment and environmental risks. As well it should be assumed that it is possible to achieve value-added results without additional costs or reimbursement if later use of the recovered piles has been specified in compromise with a regulator, stakeholders and future user prior to remedial works.[96]

There were not any legal restrictions regarding utilization process, particularly for fully clean-up zones. The process also did not face a problem related to the finding of interested parties for the cleaning of contaminated sites. Nevertheless, partial recoveries could be maintained due to the high costs of a cleaning process and relatively small risks linked with lightly contaminated areas. In such cases, the German Commission on Radiation Protection restricts the post-remedial use of the settlement for trades and industrial purposes.

Wismut remedial programme's objects followed the terms of "Federal Mining Law" regarding the utilization of waste of rocks and tailings to prevent future risks after closure of mining, in particular "Ordinance for the provision of radiation protection for waste rock dumps and industrial settlement ponds and

[96] (Hagen M. Jakubick A. T. 2011, 122)

for use of materials deposited therein (HaldAO)," restricted the post-remedial use of lands.

In accordance with the above norm, on remediated piles, there were established regular forests and green fields. Forestation has the advantage explained by the sustainability of use needing little resources. Besides requirements for the restricted use were tolerated by the regulator on the promotion of community development under the condition of obligations related to the long-term strategy and management.

Engineers approached "creative" measures by implementing projects on the installation of solar panels at the remediated sites as well as using waste rock piles elevation as a model plane airfield by the local clubs or recreational and sports and entertainment activities by the local community. An economic benefit of such approach was articulated by the point that operational costs can at least partly pay by the coming funds.[97]

Such actions can serve as a good model of a sustainable development when the remediation activities at the Bad Schlema were quite favorably coordinated with the town development and plans. In 1990, an area of about 20 hectares, spread in the middle of the city and village surrounding it, resembled the lunar landscape.

[97] (Hagen M. Jakubick A. T. 2011, 112)

In 2007 the biennial Federal horticulture show (germ. Bundesgartenschau) in Germany was held in the Bad Schlema achieving a national and international success. The horticulture exposition contributed important incentives for the future of former mining sites in the cities Ronneburg and Gera and their economic development. Later the remediation cases of Schlema and Ronneburg were proudly presented to the public by the Wismut and involved communities bringing the experience, acquired during the remediation, the international significance. Wismut nowadays performing implementation of remedial projects in the worldwide. According to the official reports, this practice was successfully implemented in the several states saving their remediation projects' costs and achieve comparable quality results of remediation.[98]

The federal government funded Wismut GmbH as an institutional beneficiary. The government has earmarked 7.1 billion euros to perform the recovery program of the environment, where 5.4 billion was spent by the end of 2010, accounting for Saxony 2.5 billion and Thuringia 2.9 billion euros.

Wismut GmbH, the last 20 years, has been making a major contribution to the former mining sites to shape and improve living conditions and economic stabilization. Remediation of affected sites is a significant prerequisite for sustainable development and attraction of investors.

[98] (STETE 2004)

Achievements for the Schlema included an establishment of grassland areas and forests for recreational use, recommencement of tourism, new industrial plants arrangement, and installation of a solar park so far. Wismut and the subcontracted local firms through the implementation of remedial projects and environmental activities made a significant contribution to job creation thereby increase in employment in the district.

Wismut company was granted further contracts equaling to 1.9 billion euros, which covered mainly equipment purchase and materials, as well as energy supply and purchase services for construction and engineering.

Positive urban development after thorough remediation and environmental recovery of the uranium legacies is excellently illustrated by the Bad Schlema community in Saxony which regained its title being a town of a spa.

CHAPTER 5. ANALYSIS AND CONCLUSIONS

5.1 Prerequisites and pinpoints of environmental regime in uranium legacy of Kyrgyzstan

USSR's environmental problems legacy largely result from the economic policy of a centralized planned economy, when centralized pricing system rewarded environmentally harmful behavior and as a result exhausted production plants created a huge environmental burden.

If to return to the Baechler's classification discussed at the first chapter there are several matters showing coincidence of key topics which can lead to social and political conflicts induced environmentally.

Inefficient agreements between states induced by the lack of political will and limited resources of the state can be described by the lack of regulatory infrastructure and poor government performance. An access to key resources becomes an issue of survival when downstream states, as well as densely populated areas, highly depending for water supply from upstream. Water and land are strategic resources and their importance increasing if countries rely on agriculture characterizing dependency on scarce natural resources.

There are also possibilities of instrumentalizing the environment which can be explained by the state control over the resources both financial and technical

which can and mobilize local actors and create groups of interest opposing to the governmental policies and activities.

Taking into account potential for cross-boundary implications and political disputes based on historical events of hazards it can be identified a spillover from a historic conflict.

In this sense the ENVSEC's assessment [99] confirmed an importance of participation of the NGOs, public sector, governmental bodies at all levels of the development process because local and public authorities are better informed about local situation and conditions, their involvement prevents possibility of misunderstandings and leads to mutual understanding, increasing of trust between national and local authorities as well as neighboring countries.

Another important finding was that memberships in international and intergovernmental organizations are a morally and socially defect misunderstanding between states. Studies have found that disputes between states have the lower likelihood if countries shared joint memberships in IGOs.

Conforming to these findings, it can be emphasized mutually beneficial interests and leveraging potential of tension through membership in international and regional institutions and active cooperation on their platform.

[99] Saba Nordström (2016, 813)

They can serve as a platform to build a dialogue, raise a trust and confidence among members as they collectively enforce mutually accepted principles.[100] During the historical observation, there were found several obstacles and challenges of building strong environmental regime. The Government as a main state-actor at the beginning have chosen an ethnocentric position to address an environmental problem occurring in the domestic territory and mainly due to assumption that the environmental security concept integrated into the national security paradigm, even though the Government realized that environmental hazard can have a possible transboundary impact.

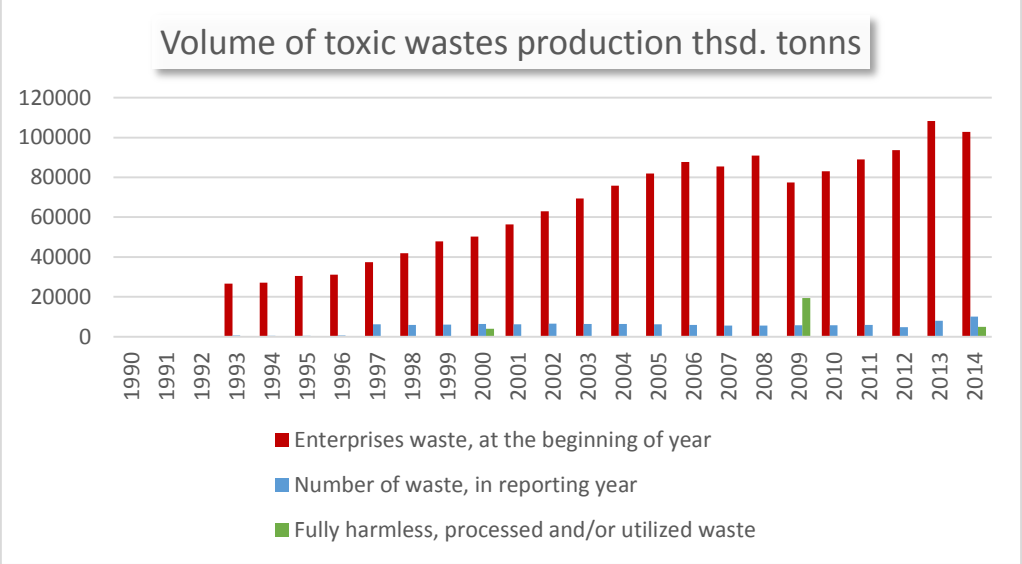

Figure 8. Volume of toxic waste production in Kyrgyzstan. Source: National Statistic Committee of KR

[100] Saba Nordström (2016, 808)

As can be seen from the diagram (figure 8) in the early stages of the independence Kyrgyzstan acquired significant amount of wastes and continued production of more, at the same time the amount of processed waste ranged at minimum level. In 2000 and 2009, 4011.4 and 19342.7 thousand tons of hazardous (toxic) wastes were disposed of in the country, 4011.4 tons of waste was disposed (remediated), in the remaining years small amounts of waste were subjected to this process.

In 2010, 73% of the waste was sent for disposal in specially designated areas. In 2011, it is recorded a significant decrease of transferred wastes amounted in 78.4 thousand tons, compared to 2010, when 185.5 thousand tons were transferred. The increase of processing wastes amount comes to the dates of waste management project implementation, other part of toxic wastes shows stable growth.

The lack of financial and technical resources brought the Government steadily move to the regional platform of cooperation with the countries sharing same history and ideology within CIS cooperation in order to address or mitigate an environmental problem of the uranium legacy sites and risks.

Since 2005 the Government applied for the support of international community to solve the problems of uranium tailings and radioactive wastes. The state did not limit itself by the regional cooperation, but highly participated in the

various international organizations and platforms like IAEA, World Bank, European Union and bilateral agreements regularly raising an importance to solve the problem. Here epistemic communities, performed by international and non-governmental organizations played an important role to build a scientific base and evidence to promote the problem globally.

Historical challenges expressed by the revolutions in 2005 and 2010 in Kyrgyzstan and the procedural obstacles uttered by the weak environmental policy and regulatory infrastructure brought to uncertainty for the international community to identify key partners in implementation of the projects which lead to the long-term delays in their implementation.

As it was pointed by Tuchman-Mathews, the concept of environmental security lies far beyond the territory of one country and embrace broader understanding and vision. It was clearly seen in the example of state-actors in Kyrgyzstan. The case when the state tends to rely only on self-help to ensure security and preferring independence to interdependence often brings to the difficulties to achieve effective international cooperation and causes systematic obstacles.[101] An issue has been strongly affected by the state when it wanted to maintain full sovereignty over its problem and rely on its own resources. This, in turn brings to another political problem of the absence of necessary conditions. According

[101] (Chasek Pamela S., Downie, David Leonard Brown, Janet Welsh 2017, 260)

to the Chasek[102], to build an effective environmental regime, there should be three conditions such as adequate level of concern, sufficient contractual environment and capacities. As it was seen from the historical assessment, there were no adequate level of concern within the governments, which further could link to the need to examine and devote resources to implement potential solutions.

At the regional level of CIS and EurAsEC, there was a contractual environment but not enough. States could gather together, negotiate, reach certain agreements on new policies and make credible commitments, helping by one-time assistance and providing joint monitoring. There were invested a lot of transaction costs like time, money, and efforts, which as stated could create difficulties in establishing a strong agreement.

Also, the Government of Kyrgyzstan did not possess with sufficient scientific, political and economic capacity to build good evidence of the threat and participate in creating the global regime, ensuring compliance with the regime's principles, norms, and rules.

Further it was observed lowest-common-denominator problem, expressed by the difficulties in negotiations and successful cooperation. When the Kyrgyzstan developed the Strategy, and applied for the support from the

[102] (Chasek Pamela S., Downie, David Leonard Brown, Janet Welsh 2017, 264-265)

international community and neighboring countries, it could not build a strong system. The origin of it could be explained by the assumption, that all states are sovereign entities and can choose whether to join an environmental agreement or reject it. Because environmental regime requires an active participation of many countries to address existing environmental issues, the country with most concern often need a support from countries with far less interest. Thus, the regime's overall effectiveness was compromised by the passive participation of the applied states.

Another obstacle to build an effective regime in uranium tailings lies on the time-horizon conflicts paradigm, related to the incongruent timescales of policy development and environmental issues. The process to create and implement effective environmental policy is not easy process like any policy making as well as it is time-consuming.

According to Pamela Chasek, Brown and Welsh[103] the international agenda must be set, negotiations convened, appropriate policies identified, strong agreements reached, and strategies agreed, and international policies implemented as well as environmental problems monitored, and international policies revised. The common practice of starting with a framework project, where involved number of countries and adopting subsequent protocols adds

[103] (Chasek Pamela S., Downie David Leonard, and Brown Janet Welsh 2014, 240-242)

too much time. Governments must ratify the agreements and protocols so that they can enter into force and be effective. During analysis of uranium case, the effective implementation of projects regarding remediation of uranium legacy sites took almost decade and consumed a lot of time postponing solution of the problem for a long time. The time-horizon conflicts are important and possesses with critical level of attention, particularly, when the environmental issues closely related to the human health and its safety. In the case of uranium tailings there was also involved significant scientific complexity and uncertainty regarding the scope and sever impact of radioactive wastes. Scientific sphere challenged the capacity of governmental actors to understand the problem and design effective policies. It possessed with dilemma, when the problem was supposed to be solved as soon as possible due to the risks and impacts, but at the same time there was a need to build good scientific basis and collect data to develop strong policy and mobilize donors. Because scientific uncertainty about an environmental problem is the most important which can lead different states to perceive the situation differently, reducing incentives cooperate or to increase, to free ride or to ignore the problem.

Inadequate translation of the regime rules into domestic policy, expressed by the absence of necessary domestic legislation. Additionally, at the political level, the lack of regulatory mechanisms and weak state administration can be

observed as one more obstacle, which uttered by the uncertainty of the Government in appointing the responsible bodies for the management of uranium legacy sites, bringing to the incapable political system which produced a certain social and political conditions.

There are also emphasized the need to strengthen the role of Technical and Scientific Support Organizations (TSOs) and their global cooperation and regulatory authorities must maintain independent, but complementary roles with technical organizations as well.[104]

Experts outlines an important role of the regulatory body on the national level, which is responsible to propose necessary policies, evaluate regulations and license the relative operations, inspections, manage incidents and emergency preparedness. Due to the case that nuclear safety and security issues are based on scientific expertise, the regulators' authoritative functions, related to nuclear facilities and other radioactive substances, needs to have permanent access to a suitable technical and scientific data. According them a sustainable performance of a national nuclear security and safety, including radioactive protection, regulatory systems require an adequately organized three major functions like regulatory body's authoritative function, technical and scientific

[104] (IAEA 2010b, 194)

advisory expert function and function to dedicate an appropriate knowledge base and associated tools.[105]

In its turn, constant generation of expertise providing a competent and timely response to regulatory needs, requires a function to develop and maintain an appropriate knowledge base and associated tools as laboratories, databases, operating technical analysis and services. These developments propose availability of trainings and education services as well as close association with R&D efforts on international and national levels in the field of nuclear safety, including radiation protection, and nuclear security.

5.2 Recommendations and spheres of cooperation

The provided information above showed an existing or potential security risk. The most serious threat to the environment not only in the state scale, but also internationally, presented by Kyrgyzstan that can become a transnational ecological disaster as a result of leakage and contamination of the river basins and river beds associated irrigation networks that have transboundary importance. The Kyrgyz Republic on the first stage of development of specialized projects, although it has some experience in conducting remediation work through international projects.

[105] (IAEA 2010b, 197).

Some countries in following sustainable performance of a national nuclear security and safety system prefers a high level of integration, with all three key regulatory functions forging into a single organization with regulatory authority, while others are making choice to create a separate, independent TSO or procure the required support services from existing technical organizations, if necessary even in other states. This dilemma arises due to several advantages and disadvantages where an integration results in a simpler organization model and gives a quick response in the time matter, while separation advantages in giving wide scientific visibility to the issues related to the nuclear safety and radiation protection, as well as leading to the public support, answering requirements of independent judgement, competence and honesty approaches.

As Kissinger stated, the intellectual is rarely found at the level where decisions are made, and his role is commonly advisory.[106]

The role of TSOs, as key actors supporting regulatory bodies, is important in an achieving a high level of global nuclear safety and security infrastructure implementation. However, regulators must be fully responsible for their own judgement and decisions, even if the decisions are based on the work of technical scientists. TSOs are providing a comprehensive and holistic view through the aggregation of specialized expert findings.

[106] (Kissinger Henry A. 1959, 33)

As mentioned above, there is a sufficient place for cooperation with Kyrgyzstan in the sphere of addressing the uranium problem, in particular, ensuring the safety of population living in close proximity to sources of radioactive contamination. The protection of the population from the effects of radon and its daughter products remains a serious problem. The lack of the necessary funding does not allow to start the development of the National Target Program in the Kyrgyz Republic.

Also, key issues of environmental hygiene like water supply of the population and condition of ecology in the area where tailing pits and dumps are located, food safety, cleanness of cities and large settlements, solid waste and soil contamination, training and development of educational programs in the field of environmental health are still actual.

Analysis showed, that issues on the development of local communities living alongside uranium tailings were not fully raised or discussed in the agenda. In this connection, cooperation in the sphere of development and improvement of the social and economic condition of the population in the regions of uranium tailings is urgent. Developmental projects can not only the social conditions but also partly cover maintenance of the contaminated areas and monitoring measures.

In addition, the implementation of infrastructure projects will solve the economic issue and increase the social benefits of the local population. In the same direction, it is necessary to equip laboratories and train qualified personnel, which will improve the monitoring and timely response system.

There important area is also connected with establishment of state enterprise responsible for the remediation of all chemical and radioactive tailings with building of its capacity. As it was seen in the example of East Germany, an effective state enterprise can make significant input to the development of the certain areas of state function, more strategically use financial resources proposed by the donors and bring some benefits in achieving sustainable preventive environmental measures. An important challenge can be caused by the lack of machines, particularly, specialized heavy vehicles capable to work in mountain slopes, allowing the removal of rocks from the dumps. The existing parking mainly refers to the 80s that do not allow to solve issues related to moving huge size of soil and materials from tailings safely and effectively, consequently introduce modern technologies for the implementation of remedial projects.

An establishment of constant monitoring zones will help to create a system informing about the status of the environmental condition and health of locals, which will provide an opportunity to restore the confidence of population,

living in the zone of influence of uranium objects, to the Government and ease the social tension. As well as information sharing with neighboring countries and international community will increase transparency, country image on international level and help to identify more ways for cooperation.

It is essential to ensure the permanent and high professional training of staff of analytical laboratories. Addressing these problems is impossible without ensuring a certain level of operating expenses for their functioning. This matter should be regarded to the priority as well and be addressed at state support or donor support level through attraction of the various investments or including to the independent monitoring system.

Considering the spatial extent of the territories and location of radioactive objects within countries of the Central Asian region, the problems of water streams pollution are relevant in the transboundary aspect, and political consequences in the region should be considered. Taking into account that quite serious issues can arise due to the lack of regulatory framework as potential sources of transboundary risk. As it was discussed in the previous chapters an effective regulatory infrastructure is important. After gaining independence, the countries of Central Asia faced a problem like imperfect regulatory and technological infrastructure. The relevant legislation and regulatory requirements for environmental protection and health in the mining sector

should provide requirements for assessment, monitoring and remediation of territories affected by contamination. Legislative acts and decrees allowing handling a remediation process adopted and applied by Kyrgyzstan. However, regulatory procedures, as they now exist, do not always include methodology to assess the condition of the environment.

Due to this the relevant international standards and rules should be adapted in safety evaluation of the former uranium legacy sites based on the identification as well as ranking of radiation and other risks associated with further remediation.

The risks to health and environment coming from contaminated sites as it was seen in previous chapters are perceived differently by various groups of people. The local population near the contaminated sites too indifferent to the threats. Meanwhile there are exist concerned groups, who are too focused on the details of impact of contaminated sites or strongly exaggerate the impact of tailings on their health. In order to find a way-out situation like this, it is necessary to develop substantial work with all interested groups, particularly providing additional information and health check-up on the qualified equipment. The aspect of good health condition can also increase international credibility of the Government.

Except the cases of the landslide intensification influence and seismic activity in the area of uranium tailings in Mailuu-Suu, stated by the Ministry of Emergency, there are no reliable data that allows to assess really proved risks for the population and potential environmental events directly related to the legacy of the former uranium production facilities.

All measures based on the preventive assessments with possible occurrence. Therefore, development of adequate remediation plans need additional research and data collection assessing the safety and predicted the effectiveness of rehabilitation strategies that are being developed in the region. In order to collect such information, it is necessary not only to develop national monitoring programs and regulations, but also to find the possibilities for their technical and financial support.

Even though donors providing large investments to strengthen technical capacity for the remediation of territories, it should also cover other types of work.

Therefore, international funding should be focused also on multifunctionality of the purchase equipment and share with updated information on latest achievements in the field of remediation technologies and know-how.

As it was considered all measures needs significant financial and technical support from the international community due to the lack of experience, weak

capacity of laboratories and medical facilities, including knowledge gap, technical ground. In this sense, cooperation needs to be handled in sustainable and long-term manner.

On the base of cooperation, South Korea can participate in the spheres of healthcare support, waste management, and technical aid. Particularly, an expertise of the South Korea in waste and water management, prevention of industrial pollution considered to be as central components of the its overseas development activities.[107]

Technical support in the healthcare sector and knowledge share as well will be beneficial and contribute to the political cooperation. Especially, taking into account uranium legacy issue on climate change mitigation due to the high dependence from influence of landslides and other hazards, cooperation will share the benefits of the green growth agenda.

Moreover, the country can benefit as a first comer from the Asian donors. During the historical analysis, all projects implemented before regarding handling of uranium problem were coming mostly from the European and US aid without significant participation of the Asian OECD members.

[107] (Aki Tonami Anders Riel Müller 2013)

REFERENCES

A. Books/Journals/Articles

#57, Law of KR. 26/06/2001. On tailings and mountain dumps. edited by Parliament of Kyrgyz Republic. Bishkek: Kyrgyz Republic.

#58, Law of KR. 17/06/1999. On radiation safety of population of the Kyrgyz Republic. In *58*, edited by Parliament. Bishkek: Parliament.

#120, Decree of KR. 9/06/2012. National Security Concept of the Kyrgyz Republic. Bishkek: President Office of the Kyrgyz Republic.

#161, Decree of KR. 23/03/1999. On transfer of tailings and mining dumps to the Ministry of Emergency Situations and Civil Defense of the Kyrgyz Republic and measures for their rehabilitation. Bishkek: Government House of Kyrgyz Republic.

#191, Decree of KR. 13/03/1998. Initial Report of the Kyrgyz Republic on implementation of International Covenant on Economic, Social and Cultural Rights. Bishkek: Government House of Kyrgyz Republic.

#221, Decree of KR. 13/07/2001. Concept of national security of the Kyrgyz Republic. edited by President Office. Bishkek: President Office

#249, Decree of KR. 16/05/2007. Development Strategy for 2007-2010. Bishkek: President Office of Kyrgyz Republic.

#263, Decree of KR. 17/07/1993. On the inclusion of tailings and dumps after the state concern "Kyrgyzaltyn". Bishkek: Government House of Kyrgyz Republic.

#269, Decree of KR. 8/05/2003. National Strategy of Poverty Reduction of Kyrgyz Republic up to 2010. Bishkek: Government of Kyrgyz Republic.

#294, Decree of KR. 13/06/2008. A set of measures to implement the Decree of the President of the Kyrgyz Republic "On the Concept of Ecological Security of the Kyrgyz Republic". Bishkek: Government of Kyrgyz Republic.

#357, Decree of KR. 2/06/2012. Strategy of comprehensive security of the population and territories of the Kyrgyz Republic in emergency and crisis situations until 2020. Bishkek: Government of Kyrgyz Republic.

#406, Decree of KR. 12/06/2012. About the Agency for Management of Tailings in the Ministry of Emergency Situations of the Kyrgyz Republic. edited by Ministry of Emergency Situations of the Kyrgyz Republic. Bishkek: Government of Kyrgyz Republic.

#460, Decree of KR. 5/07/2002. On urgent measures to eliminate the consequences of landslide in the mountains of Mailuu-Suu. Bishkek: Government of Kyrgyz Republic.

#469, Decree of KR. 16/10/2007. On approval of the Concept of Ecological Safety of the Kyrgyz Republic. Bishkek: Government of Kyrgyz Republic

#599, Decree of KR. 2011. On approval of the Set of Measures to Ensure Environmental Security in the Kyrgyz Republic for 2011-2015. Bishkek: Government of Kyrgyz Republic

#607, Decree of KR. 2003. On measures to develop an action plan and coordinate actions for the rehabilitation of tailing pits, mountain dumps in Mailuu-Suu, Jalal-Abad oblast. Bishkek: Government of Kyrgyz Republic.

#611, Decree of KR. 1999. State Plan for Environmental Health Action of the Kyrgyz Republic. Bishkek: Government of Kyrgyz Republic.

#1056-1-18, Resolution. 16/12/1999. Condition of the tailing dumps of Kyrgyz Republic and their impact to the environment of Central Asian region. Bishkek: People's Assembly of Zhogorku Kenesh of the Kyrgyz Republic (Parliament).

A., Marcus. 1991. "EPA's Organizational Structure " *Law and Contemporary Problems* 54.

A.C., Akishin. 2003. "Environmental policy of foreign countries and Russia " *Volgograd*.

A.D., Rotfeld. 1995. *Europe: The Multilateral Security Process SIPRI Yearbook* Stockholm: Stockholm International Peace Research Institute.

A.V., Yablokov. 1997. *Nuclear mythology. Notes of ecologist on the nuclear industry*. Moscow Nauka.

Agency, U.S. Environmental Protection. 1999. Environmental Security: Strengthening National Security Through Environmental Protection Washington DC: U.S. Environmental Protection Agency

Aki Tonami, Anders Riel Müller 2013. *Japanese and South Korean Environmental Aid: What are their life stories?* Vol. 8, *DIIS WORKING PAPER*. Denmark: Vesterkopi.

Atambaev, President. 2017. Speech of President of the Kyrgyz Republic Almaz Atambaev at the 72nd UNGA. edited by Office of the President. Bishkek: Office of the President.

Ayoob, Mohammed, and Publishers Lynne Rienner. 2005. *The Third World security predicament : state making, regional conflict and the international system*. Boulder, Col.; London: Lynne Rienner Publishers.

Baechler, G. . 1999. "Environmental Degradation in the South as a Cause of Armed Conflict." In *Environmental Change and Security: A European Perspective.*, edited by A. and Lietzmann Carius, K., 107-129. Berlin: Springer.

Brown, Lester R., and Institute Worldwatch. 1977. *Redefining national security*. Washington: Worldwatch Institute.

Carius, Alexander, and Programme United Nations Environment. 2003. *Environment and security: transforming risks into cooperation : the case of Central Asia and South Eastern Europe*. Chatelaine, Switzerland: UNEP.

Chalecki, Elizabeth L. 2002. Environmental Security: A Case Study of Climate Change In http://pacinst.org/wp-content/uploads/2013/02/env_security_and_climate_change.pdf, edited by Environment Pacific Institute for Studies in Development, and Security

Chasek, Pamela S., David Leonard Downie, and Janet Welsh Brown. 2014. *Global environmental politics*. Sixth edition. ed, *Dilemmas in world politics*. Boulder, Colorado: Westview Press, a member of the Perseus Books Group.
Chasek, Pamela S., Downie, David Leonard Brown, Janet Welsh. 2017. *Global environmental politics*.
Cheremisinoff, N.P 2006 "Environmental Security: The Need for International Policies." In *Environmental Security and Environmental Management*, edited by Igor Linkov Benoit Morel, 1-326. Springer.
Colombo, Dario. 2014. Environment and neoliberalism: a critical discourse analysisof three Italian cases. *Journal for Communication Studies* 7: 63-82.
Commission, European. 14/09/1992. "EC Technical Assistance to the Commonwealth of Independent States and Georgia." European Commission, accessed 20 February http://europa.eu/rapid/press-release_MEMO-92-54_en.htm.
D., Schwartz P. and Randall. October 2003. "Abrupt Climate Change Scenario and Its Implications for United States National Security." *Global Business Network*
Danilova E.A., A.A. Kist, A.V. Mukhina, R.I. Radyuk, G.A. Radyuk, U.S. Salikhbaev, A. Vasidov, and Zhuravlev A.A. 2011. "Decommissioned Uranium Mines in Uzbekistan – Impact on Environment and Health." In *The Uranium Mining Remediation Exchange Group. Selected Papers 1995–2007*, 176-182. Vienna: IAEA.
Dimitrov, Radoslav. 2002. "Water, Conflict, and Security: A Conceptual Minefield." *Society & Natural Resources* 15 (8):677-691.
E., Adler. 1992. "The emergence of cooperation: national epistemic communities and the international evolution of the idea of nuclear arms control." *International Organization* 46:101-146.
EBRD. 2012. The Environmental Remediation Account for Central Asia (ERA). In *Press release*. http://www.ebrd.com/cs/Satellite?c=Content&cid=1395251089162&d=Mobile&pagename=EBRD%2FContent%2FContentLayout: EBRD.
EBRD. January 2017. "First agreements signed for uranium mining legacy fund." EBRD, accessed July.
Elena, Kochetkova. 2010. "Political Problems of Global Environmental Security." Phd Dissertation, Department of Sociology of International Relations, M.V. Lomonosov Moscow State University (041055177).
Frank, McNeil. 2000. "Making Sense of Environmental Security." *North-South Agenda* 39.
Gleditsch, Nils Petter. 2010. "Conflict and the Environment."
Gosteva S.S., Lopatin S.A. . 2004. *State policy in the field of ecology and environmental protection* Moscow: Euroshkola.
Haas, Peter M. 1991. "Introduction : Epistemic Communities and International Policy Coordination." *International organization International Organization* 46 (1):1-35.

Hagen M., Jakubick A. T. . 2011. "The uranium mining legacy of Eastern Germany: from remediation to regional development " In *The Uranium Mining Remediation Exchange Group. Selected Papers 1995–2007*, edited by IAEA, 110-124. Vienna: IAEA in Austria.

Homer-Dixon, Thomas. 1999. *Environment, scarcity, and violence*. 1 vols. Princeton: Princeton University Press.

Homer-Dixon, Thomas F. 1991. "On the Threshold: Environmental Changes as Causes of Acute Conflict." *ins International Security* 16 (2):76-116.

Homer-Dixon, Thomas F. 1995. "Environmental scarcities and violent conflict : evidence from cases." *Global dangers : changing dimensions of international security Global dangers : changing dimensions of international security / ed. by Sean M. Lynn-Jones and Steven E. Miller*:144-179.

Humphrey Paula, Sevcik Margarita 2009. Uranium Tailings in Central Asia: The Case of the Kyrgyz Republic. *Nuclear Threat Initiative* http://nti.org/4090A.

IAEA. 2009. *Classification of radioactive waste IAEA SAFETY STANDARDS SERIES No. GSG-1*. Vienna International Atomic Energy Agency

IAEA. 2010a. Assessment and Proposals for Uranium Production Legacy Sites in Central Asia: An International Approach. IAEA Division of Radiation, Transport and Waste Safety.

IAEA. 2010b. "Challenges Faced by Technical and Scientific Support Organizations in Enhancing Nuclear Safety and Security." Challenges Faced by Technical and Scientific Support Organizations in Enhancing Nuclear Safety and Security, Tokyo, 25–29 October 2010.

IAEA. 2012. Strategic Master Plan for Environmental Remediation of Uranium Legacy Sites in Central Asia. In *CGULS*. Vienna: IAEA.

Iliasov S., Yakimov V. . 2009. Second National Communication of the Kyrgyz Republic to the UN Framework Convention on Climate Change Bishkek: UNDP.

Institute, Blacksmith. 2011. Mailuu-Suu Legacy Uranium Dumps. Accessed July 17, 2017.

J., Golub. 1998. *New Instruments for Environmental Policy in the EU: Introduction and Overview* London: Routledge.

J.C., Reitz. 2002. "Standing to Raise Constitutional Issues " *American Journal of Comparative Law* 50:457.

Jerome C. Glenn, Theodore J. Gordon, Perelet R. December 1998. Defining Environmental Security: Implications for the U.S. Army. edited by Army Environmental Policy Institute.

KG, MES. 2016. Monitoring, Forecasting of Hazardous Processes and Phenomenons in the Kyrgyz Republic for 2016. In *Emergency preparedness*. Bishkek: Ministry of Emergency Situations of Kyrgyz Republic.

KG, MES. 2017. Monitoring, Forecasting of Hazardous Processes and Phenomenons in the Kyrgyz Republic for 2017. edited by Emergency preparedness. Bishkek: Ministry of Emergency Situations of Kyrgyz Republic.

King, Gary, and Christopher J. L. Murray. 2002. "Rethinking human security." *Political science quarterly*:585-610.
Kissinger, Henry A. 1959. "The Policymaker and the Intellectual." *The Reporter* 20:30-35.
Kondratev K., Danilov-Danilyan V.I., Donchenko V.K., Losev K.S. . 1993. *Ecology and politics*. SPb: SIC of ecological safety.
Kostin, A.I. 2005. *Ecopolitology and globalistics* Moscow: Aspect Press.
KR, Decree #599 of. 2011. Set of Measures to Ensure Environmental Security in the Kyrgyz Republic for 2011-2015. Bishkek: Government of Kyrgyz Republic
Lonergan, Stephen C., Canada, Defence Department of National, Research Operational, and Establishment Analysis. 1991. *Climate warming, water resources and geopolitical conflict : a study of nations dependent on the Nile, Litani and Jordan river systems*. Ottowa: Operational Research and Analysis Establishment.
M.M., Lebedeva. 2006. *World Politics*. Moscow: Aspect Press.
M.V., Strezhneva. 2000. "Regional political institutions on the examples of the EU and CIS, socio-cultural analysis." PhD Institute of World Economy and International Relations, Russian Academy of Sciences.
Morel, Benoit, and Igor Linkov. 2006. *Environmental security and environmental management : the role of risk assessment, NATO security through science series Series C, Environmental security*. Dordrecht: Springer.
N.F., Reimers. 1992. *Hopes for the survival of mankind. Conceptual ecology* Moscow: Nauka.
news, Fergana. 2012. EurAsEC gives $38.5 million for remediation of four uranium tailings in Central Asia. edited by Ekaterina Ivashchenko.
Nuclear-News. 2017. "The News That Matters about the Nuclear Industry." accessed August 10.
O.N., Yanitsky. 2002. *Russia: environmental challenges. Social movements, science, politic*. Novosibirsk: The Siberian Chronograph.
OSCE. 2003. OSCE meeting focuses on acute danger from nuclear waste in Kyrgyzstan. edited by OSCE Programme Office in Bishkek. Bishkek: OSCE.
Paris, Roland. 2001. "Human security : paradigm shift or hot air?" *International security*. 262:87-102.
President, Speech of the. 16/01/2009. Development Strategy of Kyrgyz Republic for 2009-2011. Bishkek: President Office
Qi, Jiaguo, Kyle T. Evered, and SpringerLink (Online service). 2008. "Environmental Problems of Central Asia and their Economic, Social and Security Impacts." In *NATO Science for Peace and Security Series C: Environmental Security*,. Dordrecht: Springer Netherlands,. http://dx.doi.org/10.1007/978-1-4020-8960-2.
R.B., Stewart. 2001. "New Generation of Environmental Regulation? ." *Capitol University Law Review* 29:85-87.

R.R. Tukhvatshin, A.R. Raimzhanov, A.A. Isupova, T.M. Topchubaeva, A.A. Kazieva, G.S. Attokurova. 2017. "Assessment of impacts on human health of ecology factors of uranium pollution." *Herald of the KRSU* 17 (7):164-167.

Ragutskaya E., Baidakova N. 2001. National Report on the State of Environment of Kyrgyzstan In *National Reports on Environment* Bishkek: Department of environmental strategy and policy of the Ministry of Ecology and Emergency of KR.

Renner, Michael. 1989. *National security : the economic and environmental dimensions*. Washington: Worldwatch Institute.

Saatova G.M., Zhanturaeva B.T. . 2016. "Main ecopathology syndromes of children living in the area of nuclear waste tailings." *Interactive science* (DOI: 10.21661/r-80187):22-26.

Saba, Nordström. 2016. "The Environment and Security Initiative in Kazakhstan and Kyrgyzstan: Transboundary Environment Cooperation in Central Asia " In *Governance, Natural Resources, and Post-Conflict Peacebuilding Promoting* edited by Carroll Muffett Carl Bruch, Sandra S. Nichols, 804-816. Environmental Law Institute and United Nations Environment Programme.

Salbu, Brit, Lindis Skipperud, and SpringerLink (Online service). 2008. "Nuclear Risks in Central Asia." In *NATO Science for Peace and Security Series,*. Dordrecht: Springer Science + Business Media B.V,. http://dx.doi.org/10.1007/978-1-4020-8317-4.

SDPK. 2017. "The citizens of Maluu-Suu asks parliamentarians to Increase social payments." SDPK, accessed July

Smith, H. . 2001 Facing Environmental Security. *Journal of Military and Strategic Studies* 4.

Sneve M., Romanenko O., Solomatina A. 2013. Norwegian Support to Regulatory Authorities in Central Asia in Radioactive Waste Management. Oslo: Norwegian Radiation Protection Authority.

STETE. 2004. Cleaning up Radioactive Environments: Undoing a Wasteland. Helsinki: Finnish Committee for European Security.

Trilling, David. 2015. "Kyrgyzstan: In Radioactive Hotspot, Residents Fearful and Uninformed." Euroasianet.org, accessed July 10.

Tuchman Mathews, Jessica. 1989. "Redefining Security." *Foreign affairs Foreign affairs* 68 (2):162-177.

UNDP. 2012. National Report on the state of the environment of the Kyrgyz Republic for 2006-2011. Bishkek: State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic.

UNSCEAR. 2017. *Report to the General Assembly, with Scientific Annexes. Sources, Effects and Risks of Ionizing Radiation*. New York: UNITED NATIONS.

V.P., Torgoyev I.A. and Charsky. 1998. *Ecological consequences of radioactive ore mining in Kyrgyzstan*. Bishkek: OCEI.

Vandenhove H., Clerc J.J., H. Quarch, A. Aitkulov, M. Savosin, I. Torgoev, and M. Mirzachev. 2011. "Phased Remediation Approach for Prevention of Risks

Linked with Uranium Tailings in Mailuu-Suu " In *The Uranium Mining Remediation Exchange Group. Selected Papers 1995–2007,*, 210-222. Vienna: IAEA.
Voitsehovich, O.V. 2012. Water quality monitoring development at the locations of former uranium production in Mailuu-Suu, Kyrgyz Republic. Kiev-Osh: Department of environmental radiation monitoring of the UkrNIGMI.
Y.A., Izrael. 2006. *Possibilities for preventing climate change and its negative consequences. The problem of the Kyoto Protocol*. Moscow: Science.
Youtube. 2014. Batken Incident 1999-2000.
Zh., Markovich D. 1997. *Social Ecology* Moscow: Publishing house of the PFUR.

B. Laws/Regulations

#57, Law of KR. 26/06/2001. On tailings and mountain dumps. edited by Parliament of Kyrgyz Republic. Bishkek: Kyrgyz Republic.
#58, Law of KR. 17/06/1999. On radiation safety of population of the Kyrgyz Republic. In *58*, edited by Parliament. Bishkek: Parliament.
#120, Decree of KR. 9/06/2012. National Security Concept of the Kyrgyz Republic. Bishkek: President Office of the Kyrgyz Republic.
#161, Decree of KR. 23/03/1999. On transfer of tailings and mining dumps to the Ministry of Emergency Situations and Civil Defense of the Kyrgyz Republic and measures for their rehabilitation. Bishkek: Government House of Kyrgyz Republic.
#191, Decree of KR. 13/03/1998. Initial Report of the Kyrgyz Republic on implementation of International Covenant on Economic, Social and Cultural Rights. Bishkek: Government House of Kyrgyz Republic.
#221, Decree of KR. 13/07/2001. Concept of national security of the Kyrgyz Republic. edited by President Office. Bishkek: President Office
#249, Decree of KR. 16/05/2007. Development Strategy for 2007-2010. Bishkek: President Office of Kyrgyz Republic.
#263, Decree of KR. 17/07/1993. On the inclusion of tailings and dumps after the state concern "Kyrgyzaltyn". Bishkek: Government House of Kyrgyz Republic.
#269, Decree of KR. 8/05/2003. National Strategy of Poverty Reduction of Kyrgyz Republic up to 2010. Bishkek: Government of Kyrgyz Republic.
#294, Decree of KR. 13/06/2008. A set of measures to implement the Decree of the President of the Kyrgyz Republic "On the Concept of Ecological Security of the Kyrgyz Republic". Bishkek: Government of Kyrgyz Republic.

#357, Decree of KR. 2/06/2012. Strategy of comprehensive security of the population and territories of the Kyrgyz Republic in emergency and crisis situations until 2020. Bishkek: Government of Kyrgyz Republic.
#406, Decree of KR. 12/06/2012. About the Agency for Management of Tailings in the Ministry of Emergency Situations of the Kyrgyz Republic. edited by Ministry of Emergency Situations of the Kyrgyz Republic. Bishkek: Government of Kyrgyz Republic.
#460, Decree of KR. 5/07/2002. On urgent measures to eliminate the consequences of landslide in the mountains of Mailuu-Suu. Bishkek: Government of Kyrgyz Republic.
#469, Decree of KR. 16/10/2007. On approval of the Concept of Ecological Safety of the Kyrgyz Republic. Bishkek: Government of Kyrgyz Republic
#599, Decree of KR. 2011. On approval of the Set of Measures to Ensure Environmental Security in the Kyrgyz Republic for 2011-2015. Bishkek: Government of Kyrgyz Republic
#607, Decree of KR. 2003. On measures to develop an action plan and coordinate actions for the rehabilitation of tailing pits, mountain dumps in Mailuu-Suu, Jalal-Abad oblast. Bishkek: Government of Kyrgyz Republic.
#611, Decree of KR. 1999. State Plan for Environmental Health Action of the Kyrgyz Republic. Bishkek: Government of Kyrgyz Republic.
#1056-1-18, Resolution. 16/12/1999. Condition of the tailing dumps of Kyrgyz Republic and their impact to the environment of Central Asian region. Bishkek: People's Assembly of Zhogorku Kenesh of the Kyrgyz Republic (Parliament).

국문초록

티무르 도스맘베토브
서울대학교 국제지역학 전공

소련연방으로부터 독립을 선언한 1991 년 이후, 키르기스스탄 및 주변 중앙 아시아 국가들은 소련붕괴와 그 막대한 핵 기반 시설로 인해 야기된 환경 및 안보 문제와 같은 광범위한 문제들을 직면하게 되었다. 그 중 하나는 유기된 우라늄 광산과 방치된 우라늄 부스러기, 그리고 인구 밀집 지역 부근의 폐기물이다.

특히 접경 지역에 이러한 우라늄 부스러기들을 포함한 환경적 비상사태가 일어난다면, 이는 전체 지역 주민의 건강과 경제, 그리고 환경에 영향을 미칠 수 있다. 잘 알려진 위험요소들은 정부와 전문가 차원에서 광범위하게 논의되고 지고 있다.

본 논문의 목적은 1991 년 소련연방으로부터 독립이 후 키르기스스탄의 우라늄 지역과 방사능 원천에 의해 초래된 위험들을 분석하고 국가와 국제사회가 이러한 문제들을 해결하기 위해 수행한 노력들을 검토한다.

본 연구에서 다룬 사례들은 위험의 완전한 예를 보여주며 다른 국가에서 유사한 문제를 해결하는 데 지침이 될 수 있다.

주요어: 환경, 환경안보, 교정, 우라늄 부스러기, 우라늄 유산, 키르기스스탄, 정치, 정책

학번: 2016-28472